Engineering Library

In This Issue—*The Colorado Oil Shales*

GENERAL LIBRARY
AUG 21 192
UNIV. OF

MOTOR AGE

Volume XXXVIII
Number 8

PUBLISHED WEEKLY AT THE MALLERS BUILDING
CHICAGO, AUGUST 19, 1920

Thirty-five Cents a Copy
Five Dollars a Year

CHAMPION TRADE MARK

Champion Dependable Spark Plugs

Pretty Rough Treatment But Champions Will Stand It

TRY this test. Strike the porcelain with an iron bar.

The famous No. 3450 Insulator in Champion Spark Plugs resists this severe test perfectly. It is your safeguard against the shocks, vibration and temperature changes that constantly attack spark plugs.

Most spark plug troubles come from cracked and broken insulators—avoid these troubles by handling the plug with the name "Champion" on the Insulator.

There is a Champion Spark Plug specially designed for every type of gasoline engine.

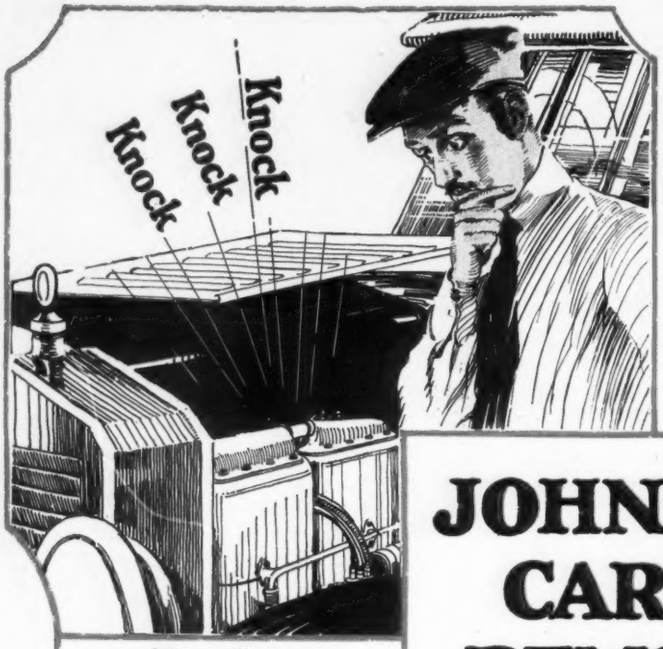
Dealers should make sure their stocks are complete.

Be sure the name Champion is on the Insulator and the World Trade Mark on the Box

Champion Spark Plug Company, Toledo, Ohio

Champion Spark Plug Company, of Canada, Limited, Windsor, Ontario

Entered as second-class matter Sept. 19, 1899, at the post office at Chicago, Ill., under act of March 6, 1879



Before

JOHNSON'S CARBON REMOVER

After

IT is carbon that steals away the power of your engine—causes that knock—and retards hill climbing. Cleanliness is the secret of a powerful motor that will take hills and pull through mud and sand on high.

Johnson's Carbon Remover is the easiest, cleanest, safest and most satisfactory remedy for carbon. It will save you $3.00 to $5.00 over other methods and without laying up your car. No experience or labor required for the use of Johnson's Carbon Remover—you can easily do it yourself in ten minutes—without even soiling your hands—and the cost is trifling.

Prevent Carbon Accumulations

You can keep your motor snappy and full of "pep" by ***preventing*** the accumulation of carbon. Don't wait until your motor is choked and caked with it. Use Johnson's Carbon Remover every 500 miles, then the carbon is removed when it is soft and powdery, eliminating frequent grinding of valves and keeping the motor always clean. Half-pints—75 cts. in U. S. East of Rockies.

Johnson's Car Savers Will Keep Your Car Young

The depreciation your car suffers depends largely upon yourself. If you run it without any attention you sell at a big loss. But with a little time, care and JOHNSON'S CAR SAVERS you can cut the depreciation in half. There's a JOHNSON CAR SAVER for every purpose—no experience is required for their use—and they can all be applied by the average motorist with perfect satisfaction.

Johnson's Radiator Cement—seals leaks in two to ten minutes—in liquid form and easy to use. Half-pints—75 cts. in U. S. East of Rockies.

Johnson's Black-Lac—the perfect top dressing. Easy to apply—dries in fifteen minutes—is permanent, waterproof and inexpensive. Half-pints—75 cts. in U. S. East of Rockies.

Johnson's Auto-Lak—enables you to revarnish your car one day and drive it the next. Pints—$1.00 in U. S. East of Rockies.

Johnson's Cleaner—will remove scum and grease and make body, hood and fenders look like new. Half-lb. cans—45 cts. in U. S. East of Rockies.

Johnson's Prepared Wax—for polishing body, hood and fenders—it preserves the varnish and protects it from the weather. Half-pints—50 cts. in U. S. East of Rockies.

Johnson's Stop-Squeak Oil—a wonderful spring lubricant. Reduces the liability of spring breakage. Half-pints—35 cts. in U. S. East of Rockies.

Insist upon your dealer supplying you with JOHNSON'S CAR SAVERS. Don't stock or use unknown brands. Write for our booklet on Keeping Cars Young—it's free.

S. C. JOHNSON & SON, Racine, Wisconsin, U. S. A.
Canadian Factory—Brantford, Ontario

MOTOR AGE

Published Every Thursday by

THE CLASS JOURNAL COMPANY

MALLERS BUILDING

59 East Madison Street, CHICAGO

HORACE M. SWETLAND, *Pres.* W. I. RALPH, *Vice-Pres.*
E. M. COREY, *Treas.* A. B. SWETLAND, *Gen. Mgr.*

Member Audit Bureau of Circulations; Member Assoc. Business Papers, Inc.

Vol. XXXVII Aug. 19, 1920 No. 8

CONTENTS

Colorado Oil Shales 7
What the automotive dealer ought to know regarding one of our future sources of fuel supply. The author of this article has spent considerable time in studying shale deposits and presents herewith a concise treatise on this important subject.

Make Your Equipment Pay For Itself 10
When you buy equipment institute a plan whereby the machinery pays for itself. In this article we tell you of such a plan.

Reclaiming Lubricating Oil 12
Much if not all of the oil used in internal combustion engines is wasted, whereas reclamation might easily save as high as 90 per cent. These articles tell of present conditions.

Doing One Thing Well 14
How one concern is making money by giving excellent service on tires and doing nothing else.

What to Know About Brushes 16
If you have thought about a paint department this article will tell you something about the equipment.

NEWS SECTION

July Production Figures 21
New Orleans Dealers Plan Show 23
Bankers to Hear of Trade Needs 23
Clearing House for Employees 24
Steel Frames Not Dutiable 24
Pipe Line Common Carrier 25
Evidence of Fuel Adulteration 25
Bankers in Charge of Maxwell 26
Fuel Cost Spell Motor Car Economy 27
Co-ordinate New Orleans Truck Tonnage 28
Milwaukee Truck Tire Ordinance 28
Industry Leaders Optomistic 29
Truck Makers' Convention 29
Elgin Race Entries 30

DEPARTMENTS

Better Business 32
Autogenous Welding 34
Standard Mechanical Operations in Tractor Service 36
The Readers' Clearing House 40
The Accessory Show Case 46
Service Equipment 47
Weekly Wiring Chart 48
Law in Your Business 49
The Automotive Repair Shop 50
Bearing Sizes Data Sheet 51
Electric Equipment Table 52
From the Four Winds 56

MOTOR AGE

MALLERS BUILDING **Phone Randolph 6960**
CHICAGO **Cable Address "Motage"**

E. E. HAIGHT, Manager
DAVID BEECROFT, Directing Editor
RAY W. SHERMAN, Executive Editor B. M. IKERT, Editor

BRANCH OFFICES

DETROIT, 95 Fort St., W., Phone Maine 1351
CLEVELAND, 536-540 Guardian Bldg., Main 6432
NEW YORK CITY, U. P. C. Bldg., 239 W. 39th St.
Phone Bryant 8760
PHILADELPHIA, Widener Bldg., Phone Locust 342-343

SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions ..... $ 5.00 per year
Canada ..... 7.00 per year
All Other Countries in Postal Union ..... 10.00 per year
Single Copies ..... 35 cents

Make Checks Payable to Motor Age

Entered as second-class matter, September 19, 1899, at the Post Office, Chicago, Illinois, under Act of March 3, 1879.

Owned by UNITED PUBLISHERS CORPORATION, 239 W. 39th St., New York, H. M. Swetland, Pres.; Charles S. Phillips, Vice-Pres.; W. H. Taylor, Treas.; A. C. Pearson, Sec.

"NORMA"
PRECISION
BALL BEARINGS
(PATENTED)

A dominant position in any field may be attained by salesmanship plus quality. But to maintain that position, quality must fight alone. For a decade past, "NORMA" Bearings have been standard in the high-grade magnetos and lighting generators identified with cars, trucks, tractors and power boats of the better class. Their dominance has not been undisputed—but their unvarying quality has maintained it.

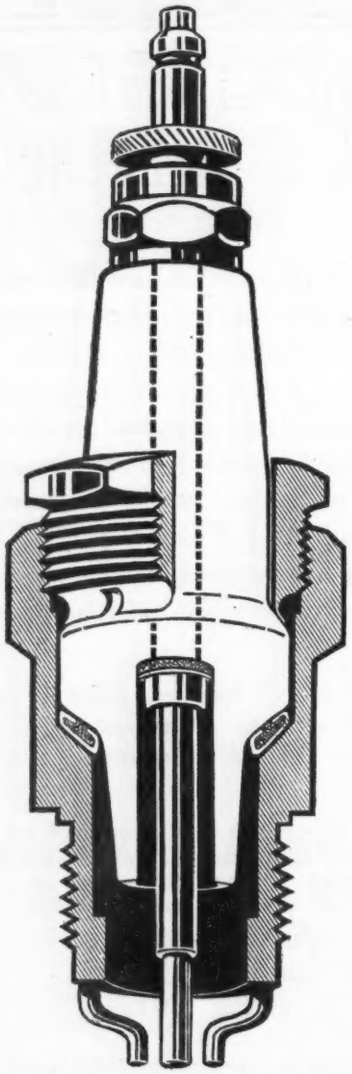
See That Your
Electrical Apparatus
is "NORMA" Equipped

THE NORMA COMPANY
OF AMERICA
Anable Avenue
Long Island City
New York

Ball, Roller, Thrust and Combination Bearings

THERE IS A HEL-FI FOR EVERY MOTOR

And this means that we have a model designed to meet the peculiar requirements of any and every type. There is a point within your cylinder where combustion must take place to obtain maximum efficiency.



The above cut shows in clear detail some of the special features of construction.

FOR PASSENGER CARS

HEL-FI spark plugs will save fuel, permit of a greater range of operation, quick acceleration and give a smooth flow of power which cannot be obtained except where every power unit is utilized.

FOR TRUCKS

The HEL-FI Standard or the Tractor Special will give maximum service under any and all conditions, delivering full power under load, and a smooth, consistent pull that will save rack and strain on the entire mechanism.

FOR TRACTORS

The HEL-FI Tractor Special is not a modified passenger car plug. It is a sturdy, powerful, durable spark plug built to withstand the most extreme possible conditions. It is the only thoroughly satisfactory Tractor plug on the market today.

FOR AIRPLANES

The HEL-FI Airplane Special plug is built after design approved by the Government and aeronautic engineers. It will not foul, fuse, leak compression nor break down. It will give 150 hours or better of actual flying service, which is from two to three times that of the average airplane spark plug. The Hel-fi Company, Belvidere, Ill., U. S. A.

Write for booklet "Why HEL-FI."

HEL-FI SPARK PLUGS

Vol. XXXVIII, No. 7 CHICAGO, AUGUST 19, 1920 $5.00 Per Year

MOTOR AGE

Millions of Barrels of Crude Petroleum in Colorado Shales

By W. E. RIGGS, Hastings, Nebr.

A lot has been said lately about the future sources of fuel for the automotive industry and among other things the shale deposits of Colorado and Utah have received considerable comment. In order that our readers might be further enlightened as to the present status of the shale deposits we present herewith an article by a man who has made an exhaustive study of shales and who is associated with men well known in the industry and their work with the United States Geological Survey.

THE extraction of petroleum from oil shales is the oldest method known to man for producing oil.

The destructive distillation of petroleum from shale is an old story in Scotland. In that country this has been a large and profitable industry for more than seventy years. The Scottish shale industry is still in a flourishing condition and is the principal source of that country's petroleum supply. The petroleum content of the Scotch shales is low, being about 23 gallons of crude oil per ton of shale, while the Rocky Mountain shales produce from 50 to 100 gallons of oil per ton. Picked shale in the De Beque, Colo., district has been known to run as high as 110 gallons of a very fine grade of crude oil per ton. It is conservative to state that the average of Rocky Mountain shales will run from 40 to 60 gallons per ton of shale.

Scotch Shales

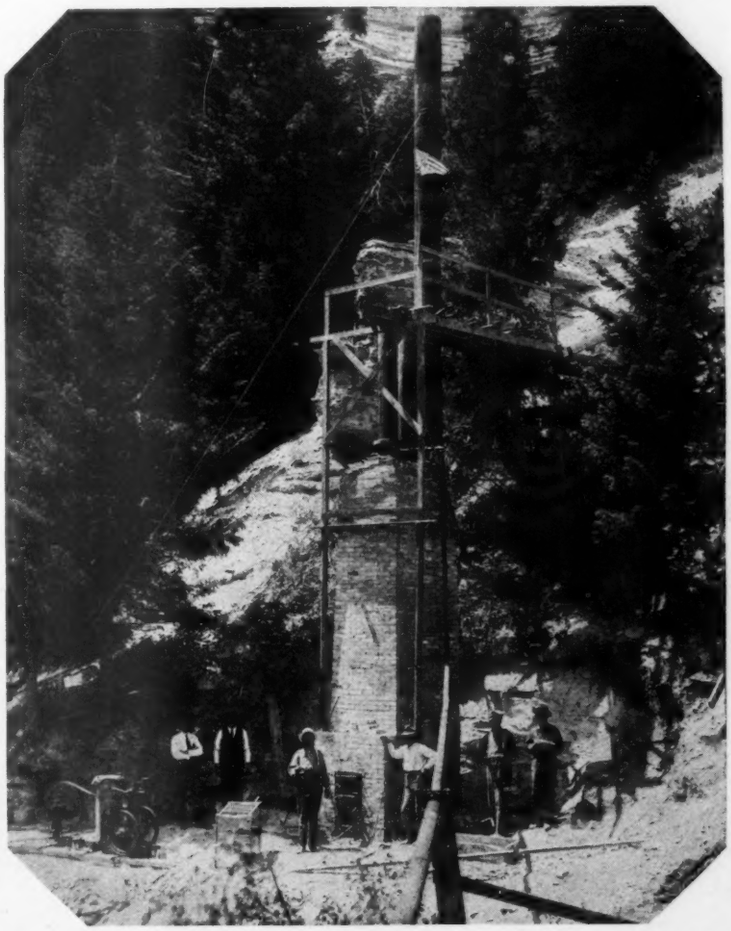
The Scotch shales present a more difficult mining proposition than do the shales of the Rocky Mountains. In Scotland shale is mined at angles as steep as 45 deg. and in strata ranging from 3 to 4 ft. in thickness, while the shales found in the Rocky Mountains are of the Green River formation and in strata ranging from 10 to 50 ft. in thickness.

The Engineering and Mining Journal has this to say regarding Rocky Mountain shales:

"These shale areas will in time be developed on as safe a basis as our coal mines of to-day. When that time arrives the remains of oil prospecting will have fled and the whole complexion of oil production will change. It will, literally, be oil mining with steam shovels in open pits and glory holes; and later tunnels and adits. There will be no lack of oil production for several generations to come, but the true oil fields of to-day will probably disappear within another generation and be replaced by oil mines."

De Beque, Colo., situated on the Denver & Rio Grande Railway 416 miles southwest of Denver is the heart of the richest shale deposits in the world. The Oil Shale Mining Co. whose offices are located in De Beque and to whom we are indebted for the illustrations that accompany this article, was the first to demonstrate that crude petroleum (shale oil) could be produced commercially and profitably from Rocky Mountain shales.

This company made its initial run on July 1, 1917, in the presence of a number of scientific men. Since the above date it has shipped and is shipping, hundreds of gallons of shale oil to all parts of the United States as well as small samples (laboratory lots) to chemists in foreign lands. Motor car dealers, owners and in fact, everyone connected with the automotive industry owe a debt of gratitude to Harry Flynn, president of the company, for his efforts in experimenting and bringing to perfection a method of recovering this vast store house of oil that at no distant date may be the source of a large portion of our petroleum supply.



The first plant of the Oil Shale Mining Co., located on "Dry Fork," 20 miles nothwest of De Beque, Colo. The initial run of this plant was made July 1, 1917

Methods of Refining

So much misinformation has been printed regarding shale oil that the writer cannot refrain from stating a few facts taken from his own experience. Certain "interests" proclaim in large type through the press that shale is coming — but it takes a world of money— that it cannot be refined by ordinary methods of refining—that you destroy the lighter gases and lose the gasoline and benzine

in the retorting process—that it is an industry that none but those with millions of dollars at their command dare enter, etc., etc. Most of these statements are in error and are put out purely as propoganda to discourage capital from entering into the shale industry; in other words they seek to keep shale out of the public eye and thereby boost the price of well oil, and incidentally gasoline.

The writer has established the fact that shale oil does respond readily to the "ordinary methods of refining" and has obtained the following results from laboratory tests: Specific gravity of samples tested from 27 to 30.4 Baume. Gasoline 14 per cent to 20 per cent kerosene and light lubricating oils 34.94 per cent heavy paraffin oils as high as 51.31 per cent, the percentage depending upon the time consumed in reduction and the varieties of shale retorted. This does not mention the many chemicals such as sulphate of ammonium (as much as 24 to 40 pounds per ton) aniline dyes—asphaltum (used in rubber tire industry) and numerous other chemicals that are used in various medicinal preparations and for veterinary purposes.

Shale Oil Not Difficult to Extract

Most men when they attempt to make a retort for the extraction of petroleum from shale make the process complicated—it is not difficult. The Oil Shale Mining Co. has used the old Henderson type steadily for almost four years and during that time they have had their engineers and technical men working on other processes and Mr. Flynn and his associates have devised a continuous process that bids fair to revolutionize the industry in due course of time. The writer has demonstrated that most of the statements made by well meaning but ill-advised writers about burning up of the lighter gasses—the destruction of the metal retort—time required to retort a ton of shale, etc., are in error. The retort is gas and air tight and no flame comes in direct contact with the gases—hence it is impossible to consume them—it is true that it requires a certain length of time to heat up and destructively distill the shale rock, however the newer types of retort built on the continuous process plan take care of all this and all the gasoline, kerosene and lubricating oil (paraffin) are recovered without the waste common around oil wells.

The favorable features in the oil shale industry in Colorado are:

1. *The enormous extent of the deposits*
2. *The great thickness both of the medium and high grade shale*
3. *The horizontal position of the strata and their height above the level of the creeks—a combination that affords cheap mining*
4. *Adequate water supply for the condensing and cooling systems of both the distilling and refining plants*
5. *Accessibility and nearness to railroads and markets*
6. *The great richness of the shale.*

Iron Retort Not Injured

The writer saw an iron retort on the property of the Oil Shale Mining Co. that had run thousands of charges and it was uninjured either by the heat, the gases, the "acid in the shale oil" or other chemicals and was apparently good for many more such charges.

The photograph of the original Henderson (Scottish type) retort which is reproduced herewith gives some idea of this type and has been an object of much interest to tourists and scientific men all over the United States. The Oil Shale Mining Co. owns about 1,000 acres of mineral land.

What Tests Show

Tests made of gasoline made from shale oil prove conclusively that it has much more power capacity than the ordinary commercial product, being particularly desirable for airplanes. It is believed that the shale gasoline will show at least 20 per cent more power. With proper carbureter adjustments shale gasoline deposits little or no carbon it is stated.

Extracts from the Colorado School of Minues Quarterly show the following relation between well oil and shale oil:

Well Oil.

Gravity, Baume	24.4
Flash	405.
Fire	485.
Viscosity at 70	374.
Color	No. 6

Shale Oil.

Gravity, Baume	30.3
Flash	390.
Fire	455.
Viscosity at 70	133.
Color	No. 4

This oil was used on a 12-hour continuous run and the test record shows the following features:

1. The engine ran for 1 hr. using the petroleum oil, and was run for 12 hrs. using the shale oil, in each case the revolutions per minute were 275 and the explosions half that figure.

2. The engine ran cooler using shale oil. It required 50 lbs. less jacket water per hour to cool the cylinder, using shale oil, four hundred lbs. of jacket water,

Ledge of Colorado paper shale showing the cut from which th e United States Geological Survey took the shipment of shale for London, England

using shale oil, kept the temperature of jacket water from vaporizer at 185 deg., while it took 450 lbs. an hour to keep it at 211 deg. using petroleum.

3. Engine carried a heavier load using shale oil. Net brake load using shale oil was 40 lbs. Net brake load using petroleum was 32.2 lbs.

4. Developed more horse power. Brake horse power using shale oil, 6.28 hp. Brake horse power using petroleum oil, 6 hp.

5. Mean effective pressure on piston was less using shale oil, showing less friction and better lubrication.

Mean effective pressure shale oil, 37.80. Mean effective pressure petroleum oil was 49.

6. Mechanical efficiency was better. Mechanical efficiency shale oil, 54.5. Mechanical efficiency petroleum oil, 52.4.

7. Engine friction was less. Engine friction using shale oil, 4.87. Engine friction using petroleum oil, 5.45.

8. Fuel used (to perform better service) was reduced 30 per cent when using shale oil.

Fuel used (kerosene) per indicated horsepower, per hour, 0.5 lbs. using the shale oil, while it consumed 0.647 using petroleum.

Features of Colorado Shales

The favorable features in the oil shale industry in Colorado are:

1. The enormous extent of the deposits.

2. The great thickness both of the medium and high grade shale.

3. The horizontal position of the strata and their height above the level of the creeks—a combination that affords cheap mining.

4. Adequate water supply for the condensing and cooling systems of both the distilling and refining plants.

5. Accessibility and nearness to railroads and markets.

6. The great richness of the shale.

These features combine to make the oil shale deposits of Colorado the most valuable deposit of their kind in the world.

In the minds of those men who are best informed on the technical and business phases of the oil shale industry, it has passed the experimental stage and "has arrived."

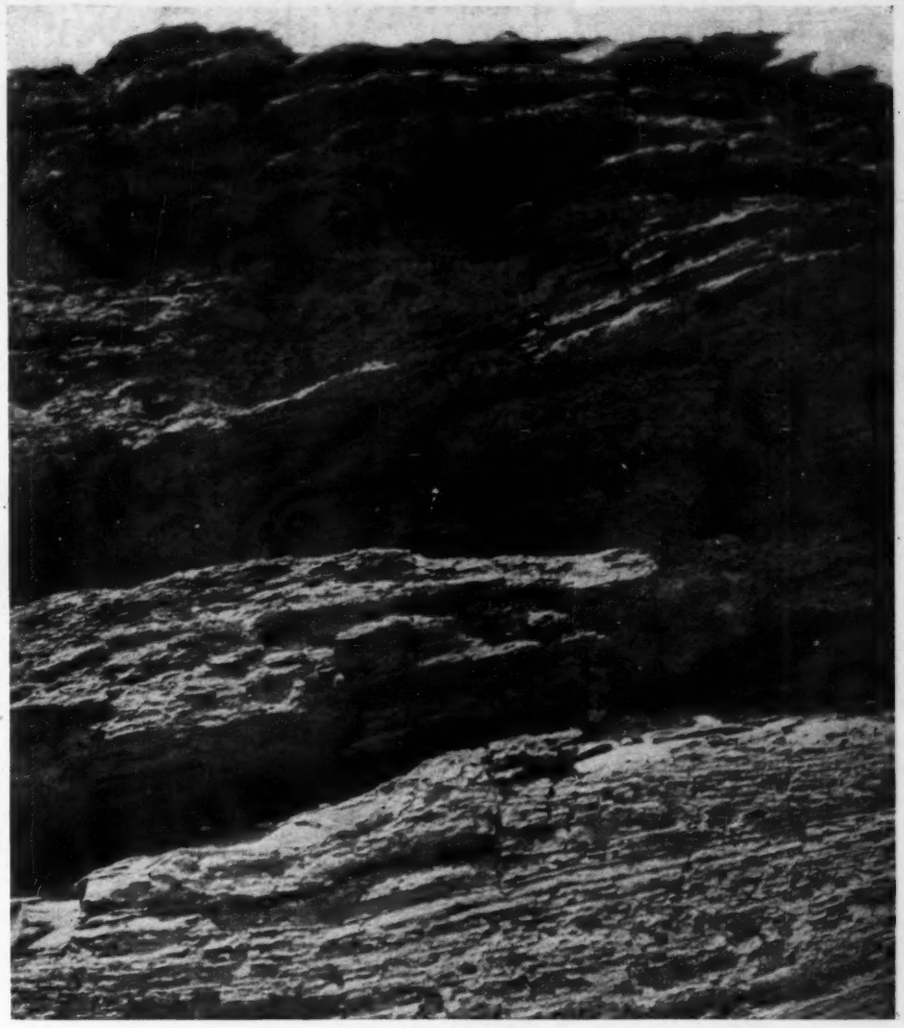
Guy Elliott Mitchell of the U. S. geological Survey has the following to say regarding shale:

"No man who owns a motor car will fail to rejoice that the United States Geological Survey is pointing the way to supplies of gasoline which can meet any demand that even his children's children for generations to come may make of them. The horseless vehicle's threatened dethronement has been definitely averted and the uninviting prospect of a motorless age has ceased to be a ghost walking in the vista of the future."

The adage "We never miss the water 'till the well runs dry" is also applicable to gasoline and lubricating oils. While beyond doubt the oil wells will in time cease to flow—they will be pumped dry—new fields will not be found and the world would be in a sorry plight indeed but here the gigantic shale deposit of the world and particularly of Colorado, Utah and Nevada step in and guarantee supply of a better quality of oil and gasoline than is now sold them.

to the motor car owner an abundant

This is not a plea for extravagance in the use of oil or gas or any other petroleum product—let us honestly, economically and sanely use it—caring for it as one of earth's greatest blessings and proceed on our journey without fear or worry that it will all be consumed and we will be a gasless and motorless world.



Ledge or mountain of massive shale on the property of the Oil Shale Mining Co.

Much comforting news is to be had from the investigation made by David White of the United States Geological Survey, regarding the shale oil fields. Mr. White says: "Shale oil deposits are a possible source of oil in amounts far greater than all the available natural petroleum in this hemisphere. They form an enduring asset, sufficient to sustain an enormous ultimate load for an indefinite period when sufficient machinery for this industry has been developed."

Then we have another reassuring statement from Captain Jay Turley, geologist, who has just finished making an investigation of the shale deposits of Texas, that there is thirty-two square miles of shale in the Somerset oil field, situated just south of San Antonio. He says that figuring each ton of shale to produce oil barrel of oil, the daily output from the field would be 290,000 barrels of oil a day for 500 years. A refinery handling this quantity of shale oil would produce 25 per cent, or 50,000 barrels a day, of high grade gasoline and 120,000 barrels of lubricating oil, besides other by-products, which includes kerosene, paraffine wax, asphaltic residue and then allowing 3 per cent for loss in treating of the total amount of producing.

Service Charges With and Without Equipment

Make Your Special Service Equipment Pay for Itself, Which It Can Easily Do

"WHY install labor saving machinery and equipment when it means a larger investment to charge against the interest and depreciation, when it saves the car owner money and saves me nothing Why should I install a large assortment of mechanical devices designed to produce rapid production in service work when the standard labor charge in this city is $1.50 per hour regardless of whether one has any labor saving machinery or not. If my service department now turns out a job in four hours time for which I may charge six dollars, and then by the installation of sufficient machinery am enabled to cut this time to two hours for which I may charge only three dollars, where do I get off at?"

A dealer is talking of labor saving machinery. He is rather vexed at the equipment salesman who is selling a jobber's line of time saving machinery. The J. S. has a smooth reply already framed to answer this dealer, and he is not answering the question for the first time either.

He says in reply, "You have answered your own question my dear sir. If you can cut the time down to half on each job, your service department can handle twice as many jobs, and that is exactly what you will do. You will do better work. Your customers will be more satisfied and they will bring their friends in and that is where you will have the jump on your competitor. Instead of his business being on the increase, it will be on the decrease and you will profit by it."

"Hu—mm, well,—if that's all you've got to say about my getting rich by using your equipment why pack up your catalogs and clear out of here. Seems to me like there's an inverse proportion of work turned out to price coming in and no matter how much time I save the car owner, with all the best equipment in the world, I only cut down the time on each job, do as much more work and get the same money. Seems to me like I'd be taking money out of one pocket and putting it back in the other?"

The dealer had the right idea on the equipment business when only the time saving factor is considered. If the time saving factor were the only thing to be considered in the purchase of equipment, better would it be to not to buy it. A machine will not pay for itself on the time saved, providing,—the machine works on a time basis at a standardized return per hour. It is simply a question of cutting down the time on each operation, getting less remuneration per operation but doing enough more to about break even.

Well then how will it pay any one to install modern time saving equipment?

Simply by charging more for your time. If a salesman who could call on ten prospects in a day, increased his capacity to twenty a day by traveling in a motor car, would not each one of his minutes be doubly as precious? Is it not worth more per unit of time to the car owner to have his car repaired twice as rapidly and more efficiently? If the service work on any car owner's car were reduced in actual time from say four hours to two hours by the use of machinery and equipment and the rate for the work raised from $1.50 per hour to $2.00 per hour the actual charge would be $4.00 as against $6.00 under the old plan of service without equipment. On this basis the car owner has actually saved two dollars, and obtained his car in one-half the time. The service station owner has not taken in quite as much money as he might have on that particular job, but his mechanic's time is less, his rate is higher and a certain amount may be credited against the price of the machine.

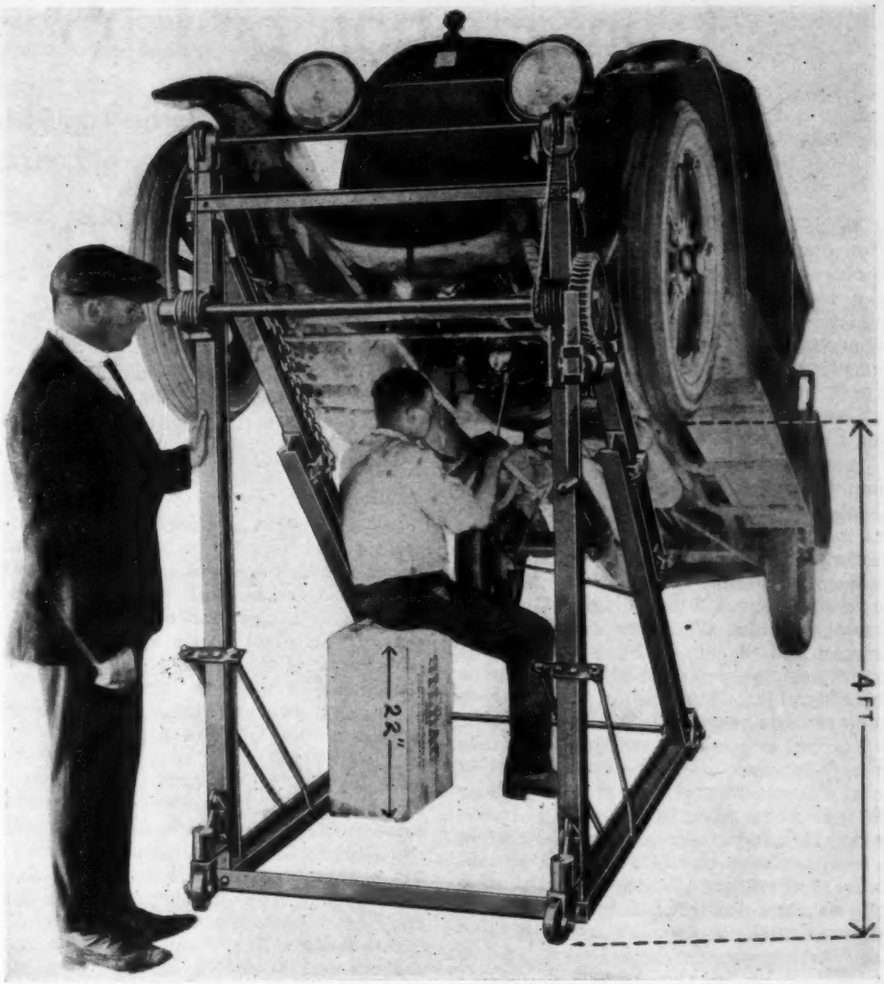
As to the actual machinery and equipment which may be reasonably charged off with an amortization fund of this kind, it seems logical to assume such equipment as a drill press, connecting rod straightener and aligner, grinder and such general equipment to be in every garage. In other words the general equipment might be termed that which should be common to every service establishment. But such special equipment as a car hoist or a complete electrical testing outfit as shown in the illustration are special in every sense of the word. The investment for this equipment must be protected and eventually covered by the earnings of that particular machine, and the only way to do this is to charge a slightly higher rate while that machine is in use. Take the Kleme hoist as an example. By using this hoist and charging slightly more per hour, and having the mechanic keep as accurate check on the time during which the hoist is used as he does on the total time on the job, a fund is automatically established which will soon pay off the machine. The Niehoff electrical test machine, a portable electrical tester, which enables the mechanic to test out the equipment while the car is still outside of the service station is not an essential piece of equipment to a service station. The service station

could get along without it, but when so much valuable time could be saved by the use of the machine and so many more jobs could be accomplished during the day with its use, and then if the machine automatically pays for itself by charging a rate for it, why get along without it?

How long would it take a machine to pay for itself, say a hoist of the kind pictured?

The machine costs $175.00. Users of it state they average twenty-five to thirty jobs per week, with it, which is roughly speaking about five cars per day handled on the hoist. If five cars are handled during the eight hours of the day, and for each hour of the machine's use, an extra fifty cents is assessed the customer per hour, the machine will earn four dollars a day. At this rate, inside of forty-five days' time the machine will have paid for itself. An interest charge may be scheduled also, and the machine will pay for the whole thing inside of fifty days. After that time the money earned by the equipment is profit pure and simple. Further than that the machine has paid for itself and its cost will not be felt.

Now Mr. Dealer had the salesman explained a method to you whereby your service establishment could have been stocked up with a complete set of tools and service equipment, free of charge, would you have listened to him?

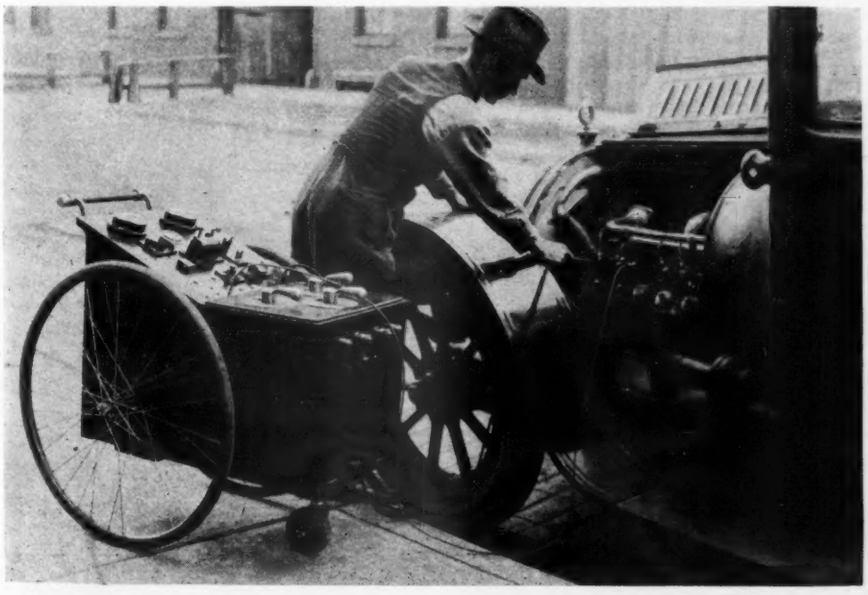


Equipment of this kind is not the one of the type that is absolutely essential to the service station, such as a set of wrenches and other small tools. But equipment of this type is so valuable in time saved the service man and money saved the car owner that it is highly advisable to add a line of this kind, especially when this equpment so soon pays for itself

Editor Favors Credits

Atlanta, Aug. 2—The Atlanta Journal, one of the leading newspapers of the South, has pointed out in an editorial the great importance of the automotive industry to the South as one of its vital veins of commerce, in condemnation of the attitude of the Federal Reserve Banks in this section which have greatly restricted automobile credit declaring the industry to be non-essential. In part the editorial states:

"Nothing could be more alien to the rightful purposes of the Federal Reserve Act or in sharper conflict with business wisdom and fair play than a singling out of the automotive industry for drastic restrictions of credit. For the sake of the principle involved, as well as the vast practical interests at stake, it is greatly to be hoped that the Federal Reserve Board will in no wise countenance, much less recommend, any policy to this effect. A rumor is abroad, however, that the regional banks have received suggestions, if not explicit instructions, to cut automotive credits to the bone and marrow, leaving the development, indeed the very life, of this great province of industry and commerce helplessly crippled. That the responsible heads of the nation's financial affairs should take such a position is almost unthinkable; certainly it could find no support, but only condemnation, from the discerning rank and file."



Here is another example of equipment that will pay for itself. The time saved by its use is not the only factor ot consider, for the higher rate which may be charged when this machine is used not only pays for the cost of the equipment, but actually saves the car owner money

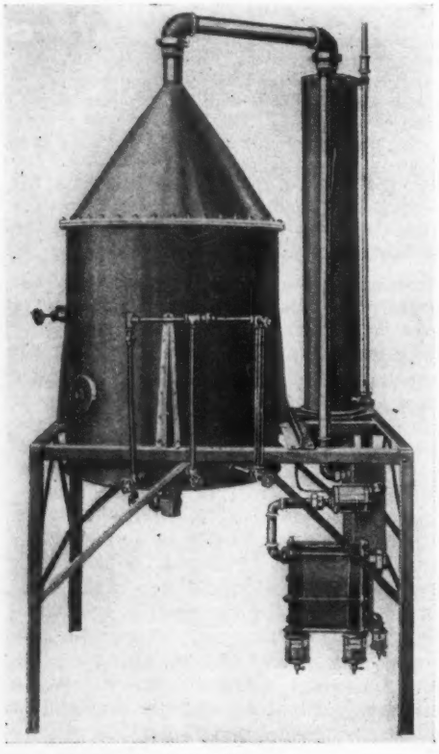
Conservation of Lubricating Oil

A Problem That Has as Yet Been Given Little Thought But Which Will Have to Be Given Serious Attention When the Shortage of Lubricating Oils Becomes Acute

BY G. REX VOLZ

CONSERVATION of lubricating oil is one of the most important problems confronting the automotive industry today and is one which has been given as little consideration and co-operation as it is possible to give to a question of as vital importance. Frankly speaking we are throwing the lubricating oil away without any thought of the possibility of reclaiming it.

A paper presented before the American Society of Mechanical Engineers in January 1920 gave the following statements concerning conservation of lubricating oil. "In the Air Service during the war, the necessity existed for the conservation of lubricating oil, and a simple system of reclamation was designed and placed in thirty flying fields in this country which brought about a considerable saving in oil and money. The records show that 40 per cent of the oil issued and used in aeronautic engines was sent back to the reclaimers and of that amount 73 per cent, and as high as 95 per cent, was reclaimed and made available for re-use. Also the test records show that this reclaimed oil was, if anything, a better lubricant than the original new oil. The engines were cleaner after its use. Fifty per cent of the flying field engineers stated, that the reclaimed oil was preferred to new oil; the other 50 per cent said it was just as good as new oil."



The Bousman Still, one of the commercial oil reclaimers built by the Bousman Mfg. Co., Grand Rapids, Mich.

The dealer and car owner have been taught that the lubricating oil is absolutely useless after being removed from the crankcase. This statement is basicly wrong.

Lubricating oil does not wear out.

Oil reclaimers are commercially successful. It is only necessary to have steam for their operation. At the present time there are several companies building oil reclaimers for commercial purposes. The illustrations shown are two reclaimers of the same type and also a centrifical oil purifier. The type of reclaimers shown are of the heat and soda ash principle of operation. The apparatus consists of a tank in which the used oil will be reclaimed can be subjected to a high temperature and an emulsion made with soda ash and water which upon heating will separate, carrying with it free carbon and other foreign matter held in suspension in the dirty oil. After the oil is dumped into the reclaimer live steam is passed into the oil and a violent agitation set up. This of course is done to distill off the gasoline. After this agitation which is carried out for a certain length of time which of course is a variable quantity about ⅛ to ¼ lb. of soda ash to each gallon of oil treated is dissolved in water to obtain a saturated solution, and a solution is mixed with the oil. The purpose of the soda is to coagulate the carbon and other suspended impurities. After adding the soda solution the oil is again agitated by steam for about 15 minutes to thoroughly mix the soda solution and the oil. The oil is then kept at a temperature of approximately of 180 degrees Fahr. and allowed to stand for about ten hours. During this time the impurities settle and the mixture remains in the lubricator in three layers, the bottom layer being water, the middle layer being sludge, and the top layer being oil. Clean oil is removed by displacing it with water and should be drawn off at a temperature at not less than 120 degrees. In the case of the centrifugal purifier where the oil is cleaned by means of centrifugal force the impurities are removed while in state of dilution which is caused by the gasoline not affected in any way manufacturers are using reclaimers of the types illustrated for the oil used in the engines on the test block. Companies operating truck fleets are reclaiming and in all cases it is not only a source of conservation but reduces the operating cost as well. They should be installed in every commercial garage. Reclaimation of motor oil can be carried on without trouble has been done and at a cost not exceeding ten cents a gallon.

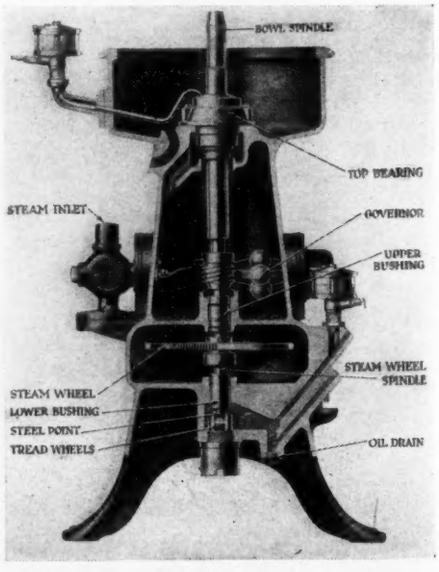
The oil properly reclaimed should be just as good a lubricant as when new, but will be dark in color and have a slightly burnt odor, correction of which will require expensive and elaborate equipment and is not at all necessary. Where reclaimers are installed oil should be removed frequently.

The engineer is now facing a very definite problem. It is necessary to reconsider the entire problem of the internal combustion engine on the basis of present day fuel and its effect upon lubricant. What is really happening in the internal combustion engine that make this problem vital.

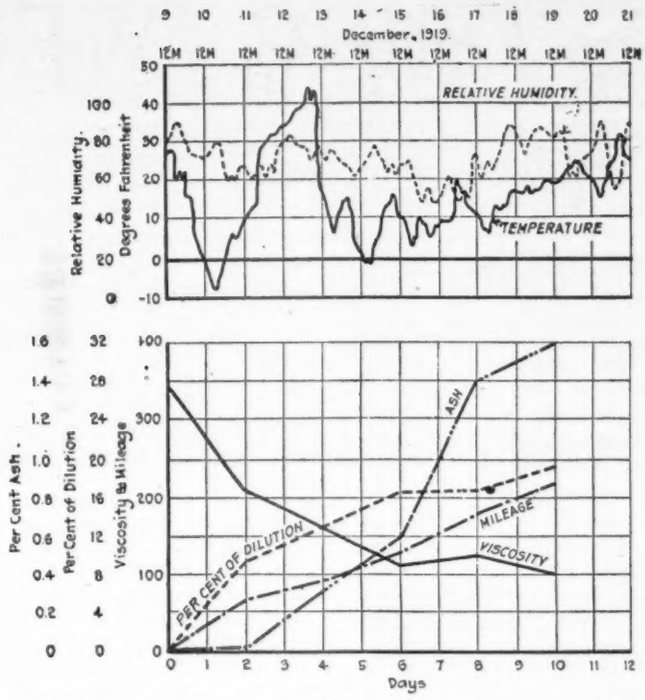
The answer is dilution of the oil.

Dilution of engine lubricating oil has always existed; this condition is caused by the gasoline mixture escaping past the piston rings, with a possible secondary cause—drainage of the diluted oil from the cylinder walls. In the earier years of highly volatile gasoline, the gas escaping past the piston rings did not enter extensively into the body of the lubricating oil, and while mechanical losses of fuel took place in all four cycle engines, this loss did not reflect itself in a problem of dilution.

In the past few years, however, due to the heavy and components of the fuel, a larger amount of fuel after passing the rings, upon condensation, remains in the lubricating oil, thus creating a condition of dilution. Not until the period of



De Laval oil purifier of the centrifugal type



Curves on viscosity and dilution taken on different days of operation with 3½-ton Packard truck

high-end-point gasoline did the matter of fuel loss become apparent, and then only in proportion to the amount held in solution in the lubricating oil. This condition, which has become especially accentuated in the past three or four years, has resulted in undue wear upon the engine parts as well as affecting the use of fuel, lubricant and power.

Tests conducted during 1911 show that the lubricating oil drawn from the crank case after use had undergone considerable physical change, the most noticeable thing being that the viscosity of the oil has been lowered during use until it was only one-half or one-quarter as much as the viscosity of the new oil. Viscosity is a term used to designate the fluidity of the oil. This determination is made on a Saybolt Universal Viscosimeter where sixty cubic centimeters (3.66 cu. in. or about 2 oz.) of oil at a fixed temperature flows through a standard orifice and the time of flow is taken in seconds. The time in seconds is then used as a standard of measurement. Viscosity is of importance because of its relationship to dilution. The flash or ignition point of the used oil was only a third of the original and in some cases being lowered from 470 degrees to 150 degrees Fahr. Other just as remarkable changes had taken place in the gravity and cold test of oil.

With the present day fuel and the present-day automotive engine, all lubricants change considerably in body within a very short operating period, this new body being the result of dilution coming from the heavy end of fuel. The amount of dilution is influenced to a great extent, by the temperature of the surrounding air, the reason being that the colder the engine, the greater the amount of fuel the oil will absorb and hold. Conversely, the hotter the air or lubricating oil in the engine, the loss will be the amount of fuel held in solution, as all of the fuel can be distilled off at high temperature.

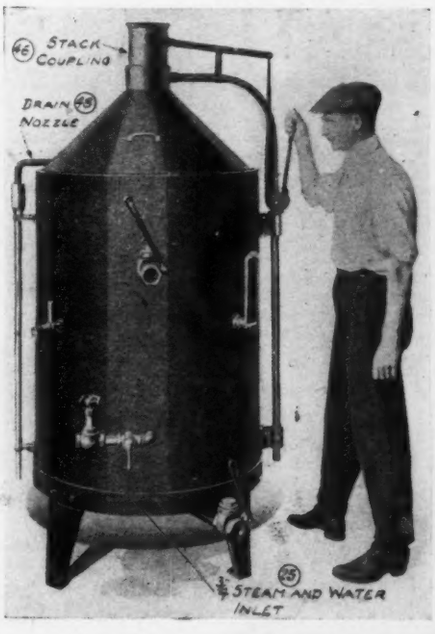
The basic rule in lubrication is best illustrated by the power necessary to operate a machine composed of a number of bearings. If the machine is lubricated perfectly with oil of the proper viscosity, the power will be at a minimum and the speed at a maximum, and there should be practically no wear on the bearings. If, however, an oil of double or treble the viscosity is used as a lubricant, the power necessary to move the machine at the same speed will have to materially increase, due entirely to the fluid friction of the lubricant itself. Under this condition there will be practically no wear as the surfaces are kept well apart. Attempting to lubricate the same machine with an oil that is entirely too light or thin for the work will also require the development of practically as much or even more power, than in the case of extra heavy oil, the resistance being due to the metallic or solid friction, one of the results of which is, of course, abrasion with the constant changing of surfaces. The general rule as applied to automotive engines when considering the dilution problem is well illustrated by a test on a tractor engine using kerosene for fuel where the output at the start of the test was 28 brake horse power; gradually dropping to 24.5 horse power in eight hours, indicating a considerable increase in frictional horse power. The viscosity of the oil at 100 degrees Fahr. changed from 300 sec. to 75 sec. at the finish of the test, at which time there was 36 per cent of dilution in the oil. The lubricant actually working in an engine should have a body at least equal to that possessed by a new heavy spindle oil (130 sec. viscosity at 100 deg. Fahr.) and an oil of such light body must be used in a forced feed system where the pressure and constant flow of the oil will make up for its lack of thickness of lubricating film.

As another example of what takes place the curve shows the results on a 3½-ton Packard truck which had run 12,551 miles. It was overhauled May 5, 1919; new rings fitted. This truck did not go out of the garage for the first two days but was run during this time for a period that would be equivalent to five miles of operation. The viscosity held practically constant for the first two days when the truck was not operating in the open. After the second day there was a drop in viscosity to 43 sec. Dilution at the end of the tenth day was 26.5 per cent.

As a matter of fact under present conditions of operation, most motor oils when in an engine, in the winter especially, are much lighter than a lubrication engineer would think of applying to the lightest piece of machinery which is a spindle in a textile mill. The result of the lubrication of an automotive engine which a mixture of lubricating oil and the heavy ends of gasoline having a viscosity below that required for a textile spindle can only result in excessive wear, and this is shown by the ash remaining after complete distillation of the sample of the mixture. The wear of the machine is reflected in repair bills, in the necessity of regrinding cylinders and refitting pistons and rings when the engine becomes noisy and when compression is lost.

In addition to the dilution which takes place there are several other factors that make it necessary to change the oil and clean the crankcase. Along with the dilution comes the accumulation of dirt and this is probably the worst thing we have to deal with. Dirt is held in suspension in the lubricating oil and forms

(*Continued on page 31*)



One of the oil purifiers built by the Richardson-Phoenix Co., Milwaukee, Wis.

DOING ONE THING WELL

Has Helped to Make the Success of a Tire Service Station in One of Our Western Cities —This Concern Found Out What the Public Wanted and Then Equipped For It

DOING one thing well has been the success of a good many people in practically every walk of life. The automobile business or any branch of it has been no exception. Some men in the automobile business have made a success by concentrating on car sales, others by their service and still others in the electrical repair business, etc. Which brings us to the subject of this story—tire service.

There are a lot of so-called tire service stations in this country but after all they amount to little more than repair shops and car owners have to drive their cars up to the curb where all tire changes, etc., are made. The curb is all right when a person simply drives up to your place for information, but if you expect to cash in on him it is far better to get him on the inside of your building. Not only will the customer then be vastly more impressed with your service methods, but he will become a potential buyer from being able to see things which he has made up his mind to buy some day. The sales, of course, depend largely on how good a merchandiser the owner of the place is.

Many of the service stations that specialize on one line of service, such as tires, batteries, etc., well can afford to take a trip with us through the service station of the Lionberger Tire & Service Co., Omaha, Neb., and see how well this concern has organized for doing well one thing—service on tires. Here is what John H. Lionberger says about the place:

GET YOUR CUSTOMERS INSIDE

One way to get more money out of your business is to get people on the inside. Street repairing never has been a dignified business and instead of cluttering up the entrance to your service station or the curb alongside it, arrange your building so your customers conveniently can drive their cars inside and also get out without confusion. The story on these two pages is about a tire service station whose owners have concentrated their efforts along one line only, but who are succeeding because they know what the car owners want and how they want it.

"Our place of business was designed, arranged and equipped to fill what I believe is a long-felt want of the motoring public—an inside service station for tires and nothing else.

"The building is 63 by 122 ft. and you will notice by referring to picture that there are two large doors, one at each side of the front of the building. The office is located between these doors, giving a fine show window. The office is 22 ft. square. At the other end of the building a space 22 ft. by 63 ft. is given over to the vulcanizing department, mounting room (where tires on rims are disassembled for repairs to casing or tube and reassembled when done), finished repair room and a stock room for new tires and tubes, also for tire accessories. Above these departments is our main stock room.

"Out of a total of 8270 ft. of floor space, more than 4400 ft. are devoted to the service floor. You will note by again referring to the picture of the outside that the door to the right is marked "Entrance Only" and the other "Exit Only." The cars drive in at one door and out at the other. This gives ample room to turn and avoids all confusion and delay. The floor is laid off by traffic lines into fifteen stalls and still leaves a driveway all the way round which is kept open at all times, thus allowing any car to get out without moving any other car.

"The interior views give a good idea of the arrangement. The counter at the back is where the customer buys new tires and leaves cases and tubes for repair. I would call your attention to the air lines, which you will notice are overhead and are pulled down by the service man when air is needed, and, as soon as he finishes, the air hose is immediately pulled up out of the way by a counterweight. There are six of these overhead lines, so arranged as to reach the front or rear wheels of any car on the floor. These air lines are fed by a 1½ in. pipe,

One way to avoid confusion in the service station is to lay out the entrance and exit in such a way that there will be an uninterrupted movement of cars in one direction. This picture shows the neat and efficient front of an exclusive tire service concern

This tire concern believes in keeping its service work confined within the four walls of its building and not out at the curb. This shows the manner in which the cars are parked

connected to two 18 by 72 in. air tanks. These tanks are supplied by twin Allis-Chalmers air compressors which can be run singly or together and which are automatically controlled, thereby furnishing a steady and sufficient pressure to all departments. There is one air line directly connected to the compressors for inflating giant pneumatics and is capable of furnishing pressure up to 300 lbs.

Up-to-Date Equipment

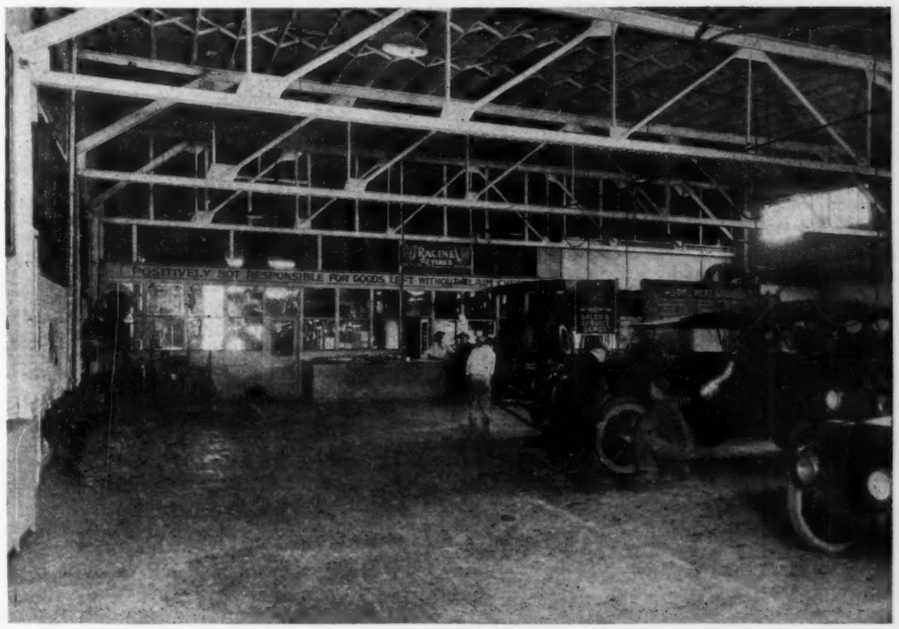
Each department is equipped with the most up-to-date appliances for handling the work it is called upon to do. Special attention is given to rush tube repairs. A mounted tire that has a puncture is demounted, the tube repaired and remounted in 15 to 20 min. if the customer is in a hurry.

"All service on the floor, such as inflation of tires, putting in tubes, mounting cases, changing rear tires to front wheels and vice-versa, and testing wheels for alignment is free. Furthermore, no tipping is allowed. We spend most of our advertising appropriation in this way, as we believe people appreciate it more than printer's ink or movie ads. We, of course, do also some of that kind of advertising.

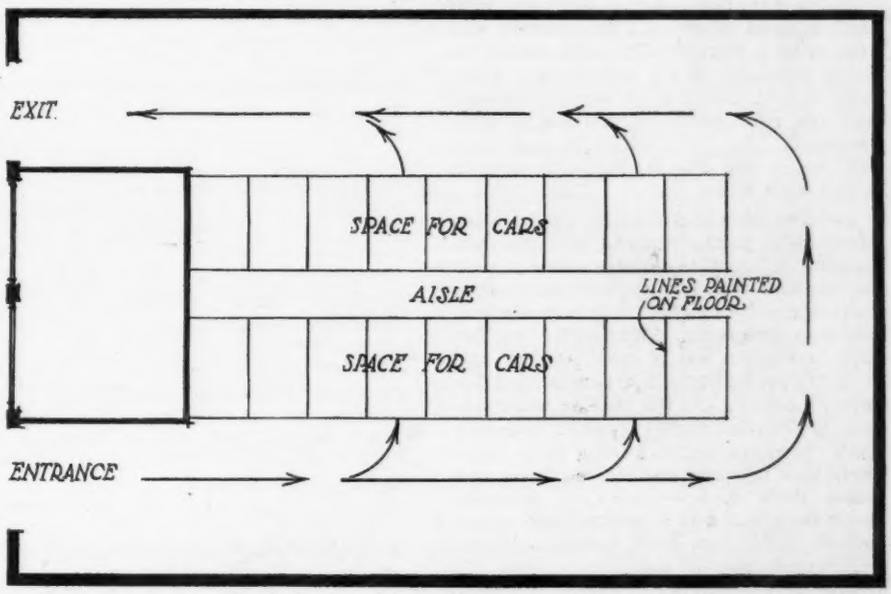
"Our service cars are equipped with air tanks and good tools and can take care of the largest giant pneumatic tire as well as the smallest passenger car tires. We charge by the mile for road service, 50 cts. being the minimum. Our motto is 'Real Tire Service.' The service department is open and road service available from 7:30 a. m. to 11 p. m. every day in the week.

"We are distributors for Racine Tires and retail Goodyear, United States, Fisk and Goodrich tires, also Kelly-Springfield truck tires.

"We have been told many times since we opened for business on September 15th, 1919, by tire men, including officials of some of the largest concerns, that we have the best tire service station they have ever seen."



A view in the rear of the Lionberger Tire & Service Co., where the repair shop is located



Schematic diagram to show how the cars are routed through the service station to avoid congestion

Brushes and How to Care for Them

If You Are One of Those Dealers Who Are Thinking About Adding a Paint Department to Increase Your Service Profits There Are Some Important Things You Should Know About Equipping For It

JUST as the carpenter becomes attached to a chisel or saw because it "never fails him," or a soldier to his rifle because he considers it his "good friend" so does the automobile painter become attached to a tool or material whose trustworthiness he can rely upon. The tools and materials used by him offer many opportunities for discourse and study. He knows that his co-called "sandpaper" is not made with sand at all, as sand particles have practically no cutting edge because they have become worn down during their ceaseless shifting by wind and water. He knows that the term "sandpaper" is a misnomer, and a name that it has never outgrown.

Flint rocks, or quartz, when crushed give particles possessing the sharpest edges obtainable, and it is such rocks that are used in making "sandpaper." Garnet ore is also used, and while it does not possess the same sharp cutting edge as the flint, it is a harder rock and makes a more durable product. These rocks when crushed to the proper degree of fineness are glued to a special paper that possesses strength in all directions, and known to the trade as Fourdrinier paper. There is another variety of it called cylinder paper, used on the cylinders of sanding machines, but this possesses strength in one direction only. The Fourdrinier paper has no grain but is fibrous and will not tear in a straight line. A high grade glue having great elasticity and adhesive qualities is used to cement the crushed rock to this paper. The process of manufacture is so continuous that while the paper is being unrolled from the spool at one end of the room, the finished product is being rolled at the other end.

From the foregoing it can be seen that a good piece of "sandpaper" will tear with a ragged edge, and will have equal strength in all directions. When bent it will give a good snapping sound and the rock particles will not become loosened. As both moisture and heat will soften the glue it should be kept in a dry cool place.

Another abrasive material used by the automobile painter that is of more than passing interest is pumice stone. It is so common that few give its interesting history much thought. It is a product of volcanic eruptions. When the molten lava is thrown out it cools rapidly and in doing so its surface becomes hard before its center. As the cooling continues the penned-in gases steadily increase their pressure until finally they force their way through the cooling mass and make their escape—pores or passages mark their exit and a porous rock, called pumice stone has been formed. It occurs extensively in volcanic regions. It is generally mined out in lumps or blocks and graded according to its fineness or texture. Ground, sifted and dried it becomes the pumice powder of commerce. Small crystals of various minerals occur in many of these pumices, and as they are harder than the pumice they will scratch a surface being rubbed and mar it. Such a pumice has not been properly prepared by its manufacturer and the use of such a material should be avoided.

The automobile painter, like other finishers, uses these abrasives on his work in order to obtain a smooth surface, and as the beauty and luster of a finish depends upon the smoothness of its foundation it readily can be seen that the importance of these materials cannot be exaggerated.

Another abrasive material of interest is the cuttle bone. It, as well as the sepia used in the manufacture of ink, is obtained from the European cuttle fish. The bone lies along the back of the creature beneath the skin, and the sepia is the fluid that it carries in its ink bag, and uses to cloud the water and elude pursuit.

Good work always depends upon good tools, and the careful workman knows that good tools rapidly become poor ones if not given the proper care and attention. Brushes are synonymous with painters, and we never think of the one without the other. The automobile painter makes idols of his finishing brushes and accords them much respect. They are often his "bread-winners" and poor ones were never known to produce good results. A brush made with the proper "hang" and "point" is always the cheapest tool to buy regardless of its price.

The materials used in automobile painting all are of varying consistencies, the color itself being the thinnest. Consequently the brushes used in handling these materials must be suited to their

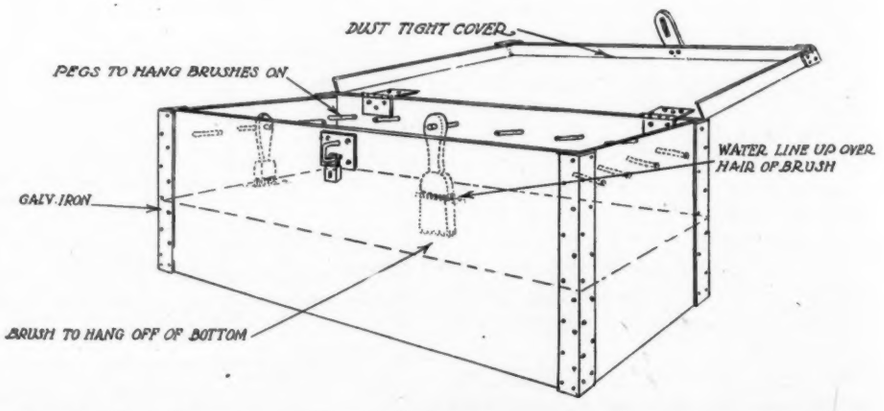
A PAINT DEPARTMENT WILL HELP SELL USED CARS

Have you ever stopped to think about what you might do with the used cars on your floor? Or, that your customers may be in the market for a re-paint job on their cars or trucks?

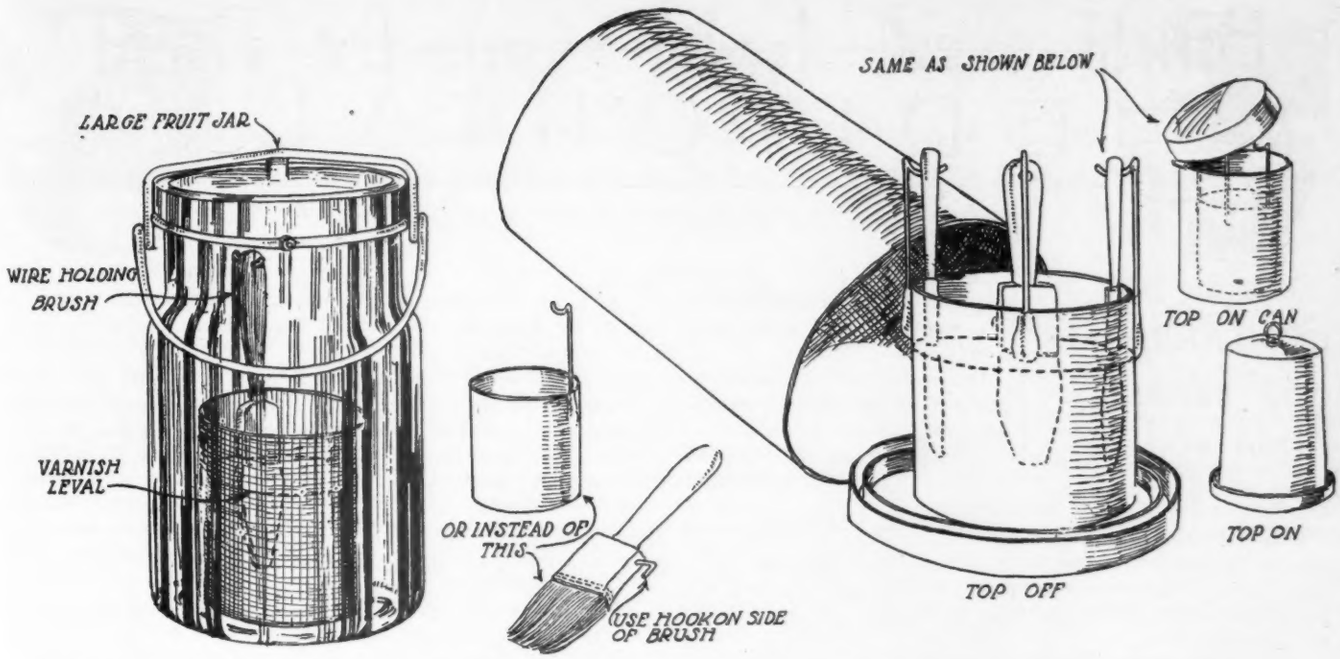
We have been running a series of articles lately on automobile painting which should be of material help to those in the automotive industry who either now are painting cars and trucks, or who expect to take on this profitable line.

This article tells you what there is to know about brushes, because an otherwise good job of varnishing or painting easily can be spoiled by a poor brush or by not properly caring for a brush. There will be other articles later on devoted to materials and shop practice. A paint department in your service station will not require an expensive outlay in equipment, but there are a few essentials with which we hope to acquaint our readers in order that they might realize additional profits from operating a painting department along with their other lines of service.

When the era of intensive selling comes some dealers are going to fall out of line because they have not looked ahead and made plans to carry them through. Although you may not be able to sell all the cars you would like to, there will be hundreds of cars running in your territory that will need service and some of this service will be painting and varnishing. It is well to think about a paint department NOW. Such a department will enable you to refinish used cars and it is surprising how well you can sell a rebuilt used car that has been refinished.



Paint brushes, like any other good tools, should not be allowed to lie on a bench or floor. This metal box easily can be made and the brushes suspended in water as shown. A brush never should rest on the bristles or hairs



Varnish brushes must be kept in the material and also under air tight covers. An ordinary fruit jar makes a good receptacle for them. The other views show a dust and air tight metal container

consistency. The bristle brush is the stiffest, next comes the fitch, then badger, ox hair and finally the camel's hair which is the softest, and consequently the one that would be used with the color mentioned above.

Bristle brushes are used where a stiff brush is required, principally with surfacing materials. Bristles are obtained from hogs, largely of Russian and Chinese vintage. The hogs, roaming the forests in large herds, are allowed to fatten and when their bristles have the proper color they are plucked from the animal, cleaned and sorted for commerce. The white French bristle is not obtained from the white hogs, but is the ordinary kind bleached white. This bleaching is supposed to add to the elasticity of the hair.

Fitch hair comes from the tail of the skunk. It was formerly a very popular brush for varnishing, but for some of the varnishes used today the fitch is a little stiff and the badger hair has about supplanted it.

The badger hair with its characteristic black stripe or center is obtained from the tail of the animal, and is used for the best grades of varnish brushes. The hair obtained from the belly of the animal does not possess the black center, and is used as a filling for the so-called "filled" badger hair brushes. Badger hair is noted for its great elasticity and life. It is more elastic than bristle, less hard and stiff and, size for size, will hold more varnish. Varnish enters and leaves it quickly. It comes in three styles: single thick, double thick, triple thick—the thicker the brush the more varnish it can hold, and the more can be applied at one time.

Ox hair in its best grades is obtained from the ear of the animal. It is a hair that is less stiff than the badger hair, and hence hardly adaptable for applying varnish on large panels. It is used chiefly with some primers and some colors that require a little stiffer brush than the camel's hair. It is also used in some of the smaller brushes that are used for touching up.

Camel's hair is another misnomer as practically none of the brushes sold as such posses any of the genuine camel's hair. The hair so-called is obtained chiefly from the tail of the brown squirrel. It is an excellent substitute, and well adapted to the work. French camel's hair is more of a gray than brown and is supposed to have a longer life.

Brushes are adulterated in the same way as paints. Good hair is placed on the outside and a poor grade on the inside where it will not show. In the best grades of brushes the hair will be found uniform from the center to the outside. The "filled" type of brush is so made, and of course undersells the best grade. It is not a bad one to work with but the best grade brush will outwear it, and as brushes improve with use, it is not desirable to have one start wearing out just about the time that it should be getting good. A good brush properly cared for should last for years. The first thing to do with any new brush is to "dry clean" it with the hand, snapping it back and forth through the fingers in order to remove any loose hairs or dirt. Never place a new brush in water. Every little hair has, as you know, a capillary tube or passageway through its center. This was its means of nourishment when on the live animal. Immersing the brush in water allows these tubes to become filled with it and the hair soon becomes harsh and brittle. On the other hand if a little linseed oil is worked into the heel of the brush, or if it is worked out well in the material in which it is going to be used, these little tubes will fill up with the oil or other material, which, if not allowed to dry out, will keep it in a soft and pliable condition. Stray hairs are a source of great annoyance when working with a quick drying material and every care should be taken to see that they have been removed.

The badger hair brushes used in finishing require even more attention and care before the ordinary workman considers them sufficiently clean. As practically all of the costs of materials are rubbed with the exception of the last coat of finishing varnish it becomes evident that a few specks from the brush in any but the last coat will be removed during the rubbing. But the last coat must be scrupulously clean, and dirty brushes are not tolerated. Clean finishing coats can be applied quickly with new brushes by some workmen who have the know-how, while others spend months in breaking in a new set of finishing brushes and even then are not able to do clean work.

It is the general practice to use these brushes in the rubbing varnish for twenty-five jobs or so before using them on the finishing coats. This frees them of specks and loose hairs and they are then considered fit for fine work. A speck in the final coat of finishing varnish on a fine job, looms up like a defect in a mirror,—hence the desirability of making sure that the brush itself is not a source of the specks.

No matter how good the brush is, or how much care and time has been spent in getting it into shape, it can be quickly spoiled if not properly cared for after use. A brush should never be allowed to stand on its end, even over night. It should always be suspended in the proper liquid with its point at least a half inch from the bottom. Brushes used for materials other than varnish are stored in soft water.

(Continued on Page 24.)

EDITORIAL

GOOD HIGHWAYS, NOT MERELY GOOD ROADS

TRANSPORTATION means industrial and social progress.

The motor car is transportation's most modern, practicable development.

Good highways are the arteries through which this life-giving fluid—transportation—must flow.

But, the extent to which gasoline propelled vehicles may relieve the burden of our congested railroads and take their place in the transportation scheme of the country is directly proportionate to the development of the highways—the arteries of transportation.

There is a movement on foot at the present time to establish the utilitarian value of the motor car. Its prime object is to emphasize the fact that the modern automobile is capable of—and in fact IS rapidly assuming a prominent role in the development of our transportational facilities, and in the upbuilding of our commercial fabric.

What stronger argument in favor of the development of good highways can be advanced than the fact that every good highway built opens the door to more highly developed and more efficient transportation in the form of motor propelled carriers?

What stronger impulse toward aggressive championship of highway development can the automobile industry receive than from the realization of the fact that HIGHWAY DEVELOPMENT MEANS AN INCREASE IN THE UTILITARIAN VALUE OF ITS PRODUCTS—and that increase means wider markets and larger sales.

But, in the activities of the various divisions of the automobile industry in the interest of highway construction it would be well to differentiate between good highways and merely good roads. There is a difference.

We have lots of good roads, but precious few good highways.

In fact, it seems to be true that in the development of our vehicular transportation arteries we have started out, in many instances, to build good highways and have succeeded only in building good roads.

A good highway STARTS SOMEWHERE and GOES SOMEWHERE in a manner that provides the most direct route between those somewheres, compatible with the interests it is designed to serve—usually between centers of population and distribution. Good roads merely are well surfaced lanes of travel that meander over the landscape like Tennyson's Brook. And, like the brook they often follow the course of least resistance.

What is needed to develop the utility of motor cars is GOOD HIGHWAYS. Automobiles and motor trucks possess the ability to deliver speed in transit, but it never has been possible for them to deliver more than a small proportion of that highly desirable service because they have been compelled to travel on roads—not highways.

Some day the country will have good highways. They will be direct routes between centers of distribution—built with the idea of furnishing efficient vehicular transportation. They will be built with the same idea that our railroads have been (with some exceptions), namely, to provide quick, efficient, effective transportation facilities and to provide avenues for commercial and industrial development.

And, we are going to give more attention, too, to what we build our highways out of. We are going to look more closely to the materials we put into them. While the development of road building has been rapid in the last few years, and on the whole we are putting better materials into our roads every day, there still is much room for improvement. There is much experimenting and much laboratory work to be done before we discover the materials out of which we can build serviceable highways most economically, and during this period of development the good roads—better highways project needs the enthusiastic, sane support of every man in every branch of the automotive industry.

Perhaps one of the greatest drawbacks the good roads movement faces is the fact that in this country, with its wide expanses of rural territory much of the burden of highway development falls upon the shoulders of the smaller, slower moving communities.

True, highway development offers to them the greatest benefits, but, it also carries with it greater proportionate financial burden, which too often is a strong obstacle in the building of favorable sentiment.

It is in these rural communities that dealers and garagemen can give effective assistance in the furtherance of the better highways movement. And they should do so—always with this thought before them, THAT HIGHWAY DEVELOPMENT MEANS AN INCREASE IN USE OF MOTOR CARS AND TRUCKS—AND THAT MEANS INCREASED BUSINESS AND INCREASED PROFITS.

AUTOMOBILE ACCIDENTS ARE INCREASING

IT HAS BEEN estimated that 10,000 people lost their lives in automobile accidents last year in this country and with about 2,000,000 more cars on the roads this year than last, we are safe in assuming that the number of deaths this year will outnumber last year's figures.

There is need for concerted action and automobile dealers must be looked upon to render a valuable assistance in the way of not only instructing their customers in the way of handling their cars, rules of the road, etc., but to see to it that repairs in the shop properly are carried out too in order that acustomer will be assued his car is safe to drive. For instance, the relining and adjusting of brakes unless executed properly may cause a serious accident and possibly result in the loss of lives.

It is one thing to observe the rules of the road and employ ordinary intelligence in driving a car, but it is another thing to be sure that a vehicle with the high potential speed of the modern automobile is in the right condition to prevent accidents or reduce them to a minimum.

Dealer associations that have already done big things in the way of getting good roads, good legislation and many other important things that directly or indirectly benefit their business should give the subject of automobile accidents their serious attention. Individually the dealer can do a lot towards minimizing accidents in the way of instructing customers and watching the work of his shop, but collectively dealers can give greater impetus to a safety first movement that may become national in scope.

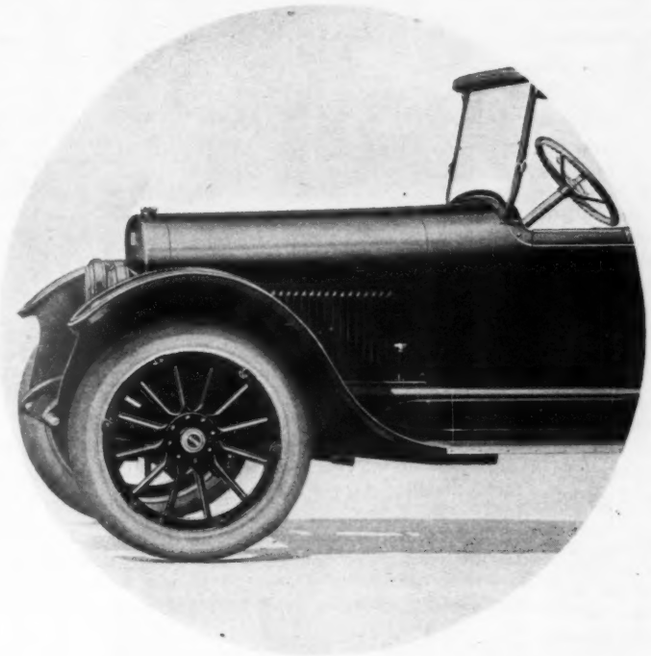
Body Changes Mark New Buick

Motor Age Presents to Its Readers the First Published Description of the New Buick Models. The Flint Concern Continues the Buick, Much the Same in Mechanical Details, But Different in Body Contours. Accessibility is a Noteworthy Feature in Connection With the New Chassis

TO THE eye the 1921 Buick is vastly different from the preceding models, but from a specification viewpoint the 1921 series is identical with the 1920. The noticeable difference in the new cars is the larger appearance that has been obtained through the elimination of the cowl line, which has adapted the body style to the straight line effect now in vogue. The mechanical changes are not startling, being typified mainly as refinements and generally wherever a mechanical change has been made it has been with the thought toward greater accessibility.

Seven body styles are mounted on the one chassis which is of two wheelbase lengths to accommodate the shorter and longer bodies. The body line is characterized by a new model, a 4-passenger coupe mounted on the 124-in. wheelbase. The full line of bodies includes a 3-passenger roadster, 5-passenger touring, 4-passenger coupe, 5-passenger sedan, all of which are mounted on the 118-in. wheelbase, the other models being 7-passenger sedan, 7-passenger touring and a 4-passenger coupe mounted on the large wheelbase.

The engine is more accessible, quiet and durable due to the changes made in dimensions, construction and lubrication. The inclosed valve-in-head, block-cast, 3⅜ by 4½ in. unit power plant is well known and needs no detail description here. The reasons for the changes will be apreciated by the notation of these changes themselves. The piston pin has been enlarged from ¾ in. to 31/32 in. in diameter to increase the diameter of the bearing in the upper end of the rod and thus make the life of these bushings practically indefinite and necessitating few or no changes. Furthermore, the anchoring of the piston pin has been made more positive by the abandonment of cotter pins in favor of a screw fastening.



The hood of the new Buick bears a straight line

SPECIFICATIONS BUICK 1921

No. of cyls.	6
Bore	3¾ in.
Stroke	4½ in.
Cyls. cast	Block
Cly. shape	I-head
Valve location	Overhead
Cooling	Centrifugal pump
Lubrication	Circulating splash
Gasoline feed	Cacuum
Ignition	Delco
Starting and lighting	Delco
Clutch	Disk
Gearset	Three-Speed selective
Rear axle	Floating
Tires 118 w.b. cars	33x4 in.
Tires 124 w.b. cars	34x4½ in.
Front springs	Semi-elliptic
Rear springs	Cantilever
Steering gear	Split nut and worm
Wheelbases	118 and 124 in.

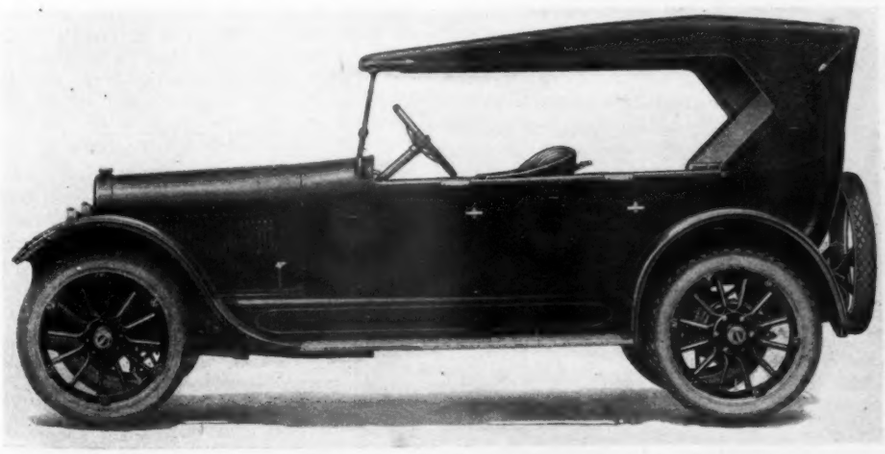
Increased area has also been given both the front main and camshaft bearings. The front main bearing length has been increased from 2⅛ to 2¾ ins. and two extra studs have been added. Besides increasing the front camshaft bearing size, the bushing is now pressed into the crankcase in the same way as for the two center bearings, thus increasing the accuracy in centering the camshaft gear.

Probably the most important change on the engine is in the timing gears which are particularly designed for silence. A very wide face Fabroil gear is now used in place of cast iron and the mating width of gear face has been increased from 1 in. to 1¼ in. In connection with this change the lubrication of the timing gears has been altered from heavy oil to motor oil circulated automatically from the crankcase. Oil is fed into the gearcase from a splash pocket in the front end of the crankcase and overflows through a drain hole back to the lower half of the crankcase.

Water Pump Accessible

A stiffer support is now used for the pump shaft bearing and the construction is now such that all bearings will be reamed after bolting to the crankcase in order to secure an accurate gear center. The water pump cover is now put on the rear side, making it possible to take out the impeller without removing the shaft and the body is clamped in a round bearing to insure a better line-up of the pump shaft.

Other miscellaneous improvements on the engine include an increase in size in the generator coupling for silence and life, a higher fan on account of the higher radiator, accessible drain cocks which allow of draining off the oil or water without getting beneath the car and an increase in cooling capacity. The new shape of the radiator gives about 5 per cent more exposed core surface and due to the increase in the depth of the core from 2½ to 3 ins., the cooling capacity is increased about 8 per cent.



Square doors and a straight line hood set this new model Buick apart from its predecessors

On the clutch there has been but one change and this in the direction of accessibility. It is possible on the new model to lift the floor board and by the use of an ordinary wrench to turn a hex extension nut in either direction to secure any desired adjustment. In view of the general inaccessibility of this adjustment this is a noteworthy point.

The shackle bolts at the rear of all the front springs have been increased in diameter from 9/16 to ⅞ in. This has been done for the purpose of reducing all wear on the bolts and bushings and to increase the factor of safety. The front spring shackle bracket is more rigidly fastened to the frame.

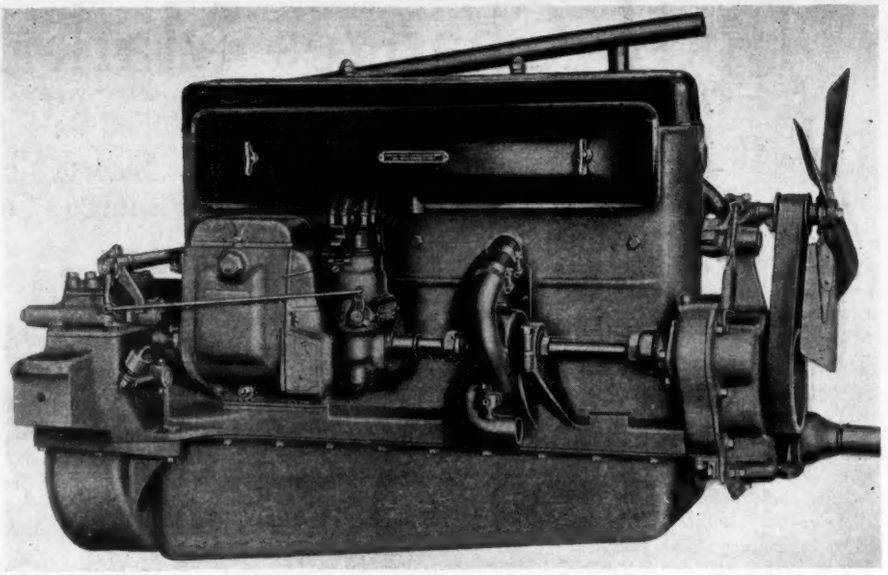
New Muffler Design

A chassis improvement which is indicative of the detail study put on these new models is the use of a new muffler. The method of supporting the inner shells has been improved to allow relative expansion and contraction by so arranging the support that this will be taken up in the bend of the supporting brackets for the inner shells. This prevents them from working loose when heated and cooled. The heads are welded to the outer shells, giving a muffler without gaskets and which is claimed to be absolutely free from leaks and proof against blowing up.

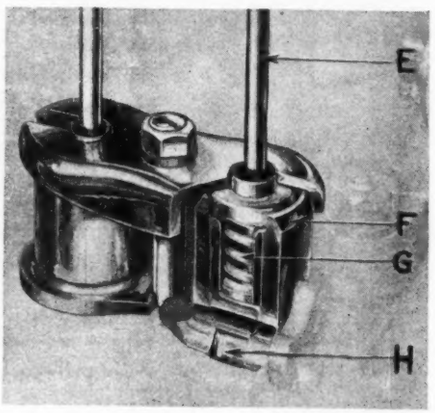
Two details which will be appreciated by the driver are the fitting of a gasoline gauge registering on the dash on all closed models and the supplying of a superior grade of tools and tire pump with the car.

In the electrical equipment most of the improvement centers around the use of the new Delco distributor unit in which the spark advance is secured by moving the cam instead of the entire head as on the previous models. This distributor head is held by hinged spring clamps of improved design. The generator drive coupling has been made larger to provide more wearing surface at the lugs, giving a quieter and more durable assembly. The condensor is now mounted on the distributor breaker box close to the contact points to reduce the arcing and consequently prolong the period between adjustments.

To improve the accessibility under the hood the coil has been taken from the generator to the driver's side of the dash. This permits of reaching the spark plugs more readily. An important improvement in the electrical switch is that it cannot be locked in the one position, so that the engine cannot be locked while running.



Several minor changes have been made in the new Buick engine. One which can be seen from the illustration is the distributer housing which is now stationary, spark movement being obtained by moving the cam



Accessibility marks the new engine. By removing the one nut the push rod E, push rod spring G, and its barrel F can be removed

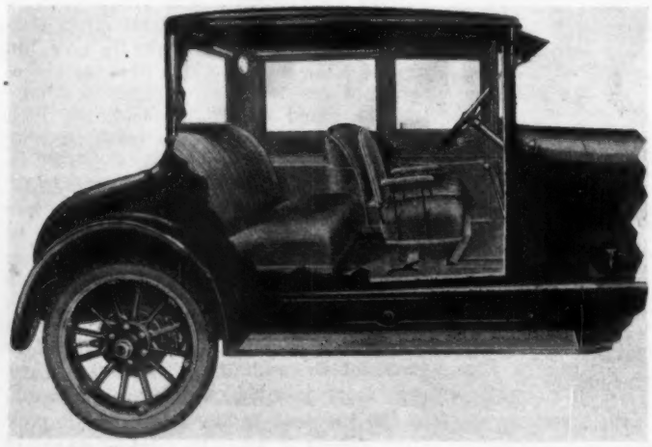
The lighting switch has now four positions allowing the burning of the side and tail lights on the closed bodies. It provides combinations of head and tail, dimmer and tail, side and tail and off. An additional button is now provided for the cowl lamp so that it can be lighted independently of the other lights. The lamps themselves have all been improved and are of more handsome design. The headlamps are larger and the lamp equipment is standard for all models.

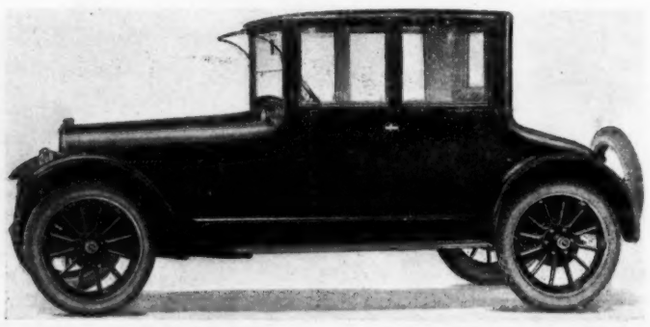
Battery Accessible

The battery is more accessible in the close jobs as it can be reached through trap door in the floor boards. The battery has been improved by increasing the burning area of the battery posts by 300 per cent. The battery ground connection has been changed from a strap which was bolted to the battery box support to a flexible wire bolted to the frame of the car thereby providing a more positive ground connection which is flexible and not apt to come loose.

On the new models the steel felloe wheel is used, rather because of the scarcity of good felloe wood than because of inherent advantages although it is claimed that a slight gain in strength is made, and the appearance is about the same as the all wood wheel. The rim,

(*Continued on Page 22.*)





The 21-48. A new Buick model mounted on the large wheel base chassis. Ample room for four passengers is provided.

Slowing Up in July Production

With Slackness of Demand Held Partly Responsible, Manufacturers Have Turned Their Attention to Diversion of Product to Foreign Fields—Detroit Dealers in Good Shape

DETROIT, Aug. 13—The effect of the slowing up in demand, the financial stringency, transportation congestion and the general feeling of unrest, due to panicky rumors is shown in the production report for the Detroit district during July, passenger car output falling off 13,962 and truck output 4,475 as compared with June. The passenger car total for the month was 147,299 and 15,468 trucks.

The total figures are not indicative of the true situation for the reason that the heavy production at the Ford factories alone prevented the total from being several thousand less. Ford in June produced 72,931 cars and 10,931 trucks. The Ford July report shows an output of 83,262 cars and 9,251 trucks.

All factories except Ford in June produced 88,330 cars while July records show a production of but 64,037, a decrease of 24,293. July production in all factories except Ford's shows a decrease of 2,795 compared with June figures.

Despite the showing up in demand and the consequent curtailment in production a spirit of optimism prevails in the industry and factory executives express confidence that the crisis has been passed. This, however, must not be taken to mean that conditions that have existed in the last year are expected to

A steady and continued demand for cars and trucks for the American market is declared certain to follow the lull, however, and keep the majority of the factories busy in the effort to maintain production at what was considered normal before the extraordinary demand, brought about by abnormal conditions due to the war, caused manufacturers to increase their schedules out of proportion in their over enthusiasm.

Slowing up in domestic demand has prompted efforts of manufacturers to increase the export shipments. Hudson Motor Car Co. shipped about 20 per cent of the July output overseas and Essex Motors export business amounted to about 33 1/3 per cent. Hupp Motor Car Co. announced an increase in export business from 25 to 33 1/3 per cent of their output in July. Similar increases are shown all down the line and vigorous effort to overcome the slump by diversion of the product to foreign fields is being made.

The automobile dealers in the Detroit district have been busy since the Federal Reserve edict curtailing loans and as a result all of them are in position to finance their sales. Various methods have been resorted to and in all instances factories have co-operated with the dealers with the result that all dealer advertising informs the public that it will be taken care of in automobile purchases, on a reasonable credit basis. Conditions in Michigan, of course, do not reflect the general conditions. Dealers in this territory are in much better shape than in some of the states, especially where a divergent crop does not obtain. Dealers in the wheat states naturally are hit hardest. Elevators are said to be filled and with the transportation system crippled even much of last year's crop has not been taken care of.

Transportation Hampers

The Willys-Overland factory at Toledo has let out about 2,500 workers and this announcement was followed by the statement that the Bock bearing company plant would discontinue its night shift. The department affected by this order will be out of operation 90 days. Officials of the Bock plant declared there is a readjustment coming in the automotive industry which takes all of the output of the Bock plant necessitating the cutting off of the night shift to reduce the output.

Vice-president Earl, of Willys-Overland, said production had been hampered by failure to receive supplies. He said the policy of the factory in retaining married men during the slump would be continued and that production would continue on a curtailed schedule. The men laid off, Mr. Earl said, was made up of the surplus labor at the plant.

Milwaukee, Aug. 16—A fair volume of business is being maintained by local dealers, although the demand lacks its customary snap and it remains difficult to interest buyers. Dealers are insisting on cash business so far as possible, and when time contracts are made, demand short terms and rates of interest at least equal to the abnormally high rates of interest charged by banks, which now range up to 7½ and 8 per cent. When bankers are shown short-term contracts at the prevailing rates, dealers do not find it hard to discount notes, although the moral risk is carefully scrutinized. The lull in trade so far in August is not unlike that in former years. It is expected to be overcome sooner than customarily because the Wisconsin State Fair is dated two weeks earlier than ever before, and will be held Aug. 30 to Sept. 4. The fair-time usually marks the beginning of a new and active season following summer dullness.

Chicago, Aug. 13.—Various factors have entered into the slowing up of the automobile industry in this city. While there appears to be a relatively good demand for both cheaper and moderate priced cars, it is also evident that there is a less active call for those of higher price. This inaction is due in a large measure to the restrictions placed by bankers on credits. With the cars that are most in demand a set back is experienced. Reasons assigned for this condition are the same as given in other parts of the country. Limited transportation facilities figure largely in the situation. One dealer of a popular make car has his salesrooms empty with half a dozen typewritten sheets of orders on his desk which he cannot fill because cars are not coming through. When this condition will be remedied is uncertain; perhaps in six weeks time and perhaps longer.

How soon the horizon will be cleared as far as bank credits are concerned is another question which seemingly remains unanswered. One banker who has gone over the situation very carefully finds that possibly 70 per cent of the deliveries made during the first six months of the year were made on other than a spot cash basis.

NEW YORK, Aug. 14—Not the slightest doubt is felt by the leaders of the automobile industry that the future is secure. They know absolutely that the wonderful expansion which has marked the past ten years will continue for the next ten. This is true not only of passenger cars but of trucks and tractors. There may be numerous failures before the present storm is over but they can do no more than slow up the great machine for a little while. Nothing which will happen can permanently check its progress. It is too big and powerful to be seriously damaged. Automobiles are transportation and if the industry of the world is to move there must be an abundance of transportation.

Improvements in the morale of railroad managers and workers has been evident since the increase in rates and wages were granted. Large orders have been placed already for new equipment and this will insure activity in steel mills, locomotive works and car building plants. These workers will possess large purchasing power in the districts in which they live and these sections will be good potential markets.

Sales Prohibited Unless Parts Branches Are Opened

Bill to Be Introduced in Arkansas Legislature Asks for Distributing Houses of Stations

ST. LOUIS, Aug. 16—Motor car distributors in St. Louis have been stirred by news of an act to be introduced into the next General Assembly of Arkansas, requiring "vendors of motor vehicles to establish branch houses or stations for the supply and distribution of parts." In a letter to the trade, enclosing a copy of the law, P. H. Brockman, president of the St. Louis Automobile Manufacturers' & Dealers' association, declares that "this is one of the most unreasonable acts that has ever been introduced in any state."

"Section 1—That it shall hereafter be unlawful for any person, firm or corporation to sell, or offer for sale, any automobile, tractor or motor vehicle of any kind, character, or description, in this state unless and until such person, firm, or corporation, shall have established in this state one or more branch houses or stations at which parts for any such automobile, tractor or motor vehicle are kept in ample supply and quantity to supply the demand for any or all such parts by patrons within this state.

"Section 2—Before any person, firm or corporation shall be permitted to sell or offer for sale, either directly or indirectly, any car, automobile, tractor or motor vehicle, it shall file an affidavit with the Secretary of State, to the effect that it has established one or more branches or stations in this state at which any and all parts which may become necessary for the renewal or repair of such car, automobile, tractor or motor vehicle, or any part thereof, may be had, and shall also designate the place or firm carrying such parts, and in addition thereto shall file a bond in the sum of $10,000, to be approved by the Secretary of State to the effect that it will pay and discharge any and all damages arising out of delays or otherwise, which may result from the failure of any such person, firm or corporation to fully comply with the provisions of this act.

"Section 3—This act being for the immediate preservation of the public health, peace and safety, an emergency is hereby declared, and this act shall be in full force and effect from and after its final passage and approval."

WARDWELL HEADS BRISCOE MOTORS

Jackson, Mich., Aug. 14—H. F. Wardwell, who for the last three weeks has been in charge of the Briscoe Motor Corp., will be elected president by the board of directors at a meeting to be held Aug. 18, according to information received at the Briscoe plant to-day. Mr. Wardwell succeeds Frederick C. Cowan, who has been transferred to Joliet, Ill., to take charge of foundry interests operated by the syndicate in control of the Briscoe corporation.

Mr. Wardwell comes to Briscoe from the Burnside Steel Corp. at Chicago, of which he has been president for several years.

Chicago, Aug. 16—At the office of the Burnside Steel Corp. no intimation was given that the election would affect Mr. Wardwell's association, as president, with the Chicago corporation.

EMPLOYEES BUY STOCK

Indianapolis, Ind., Aug. 14.—More than one-third of the employees of the Midwest Engine Co. have purchased $128,000 of the company's preferred stock, according to John A. Wood, president of the company. The company recently increased its capital stock to $8,000,000 and is planning a general expansion of its business.

New York Abandons Tractor Demonstrations This Year

Ruling of National Implement and Vehicle Association Affects Plans Made by State

ITHACA, N. Y., Aug. 16—New York State Tractor demonstrations, which have been made during the past year, some of the most comprehensive in the country have been abandoned for this year. The State Department of Agriculture which has conducted the demonstrations in cooperation with the Department of Rural Engineering of the New York State College of Agriculture has given up the demonstration plan which covered several separate exhibits for this year.

Body Changes Mark New Buicks

(Continued from page 21)

as compared with the previous models. The general contour of the shroud has been worked out to harmonize with the new radiator and hood shape. The windshield brackets have been assembled inside the cowl eliminating the old style outside bracket. An angle weather strip has been fitted on the cowl to make a tight joint between the windshield rubber and the body. A bead is stamped in the running board apron which on first sight would seem to be simply a matter of improving appearance. It has been found, however, that it acts as a stiffening device which has had a great deal to do with removing the drum-like noise sometimes caused by this member.

The instrument plate has been moved forward 1 in. This gives more clearance for the operating levers and the bottom of the plate has been improved in appearance by the use of a curved line. The sides of the body are about 1 in. lower and a new style door lock has been developed so that an outside door handle can be used which will open the door when turned in either direction. The inside door lever has been retained so that the door can be opened from inside the body.

The door jambs are metal giving a cleaner finish, and to clean up the exterior appearance of the car the outside top irons are left off and in their place a plug is inserted in case the owner desires to ride with the top down he can remove the screw plugs and insert the tire irons. Scuff plates of aluminum are provided on all models.

On the three-passenger open body the doors have been made 2½ in. wider than previously and have square corners. The body and top are extended back of the driver's seat to provide enough room for an extra compartment large enough to accommodate two suitcases. The rear of the body has been made wider and the fenders fit in the wheel housing in the same manner as on the five and seven passenger models. The door on the top of the deck has square corners to harmonize with the side doors.

On the five passenger open body the doors have square corners and the rear doors have been made 1¼ in. wider than on the previous five-passenger car. The rear of the body has been increased 1 in. all of which has been put into increased seat width at this point. An improvement in equipment is the fitting of wool carpet in place of jute in both the five and seven-passenger models.

The closed bodies have all been improved. A leather sunshade is used in place of the three-piece windshield formerly employed and a windshield wiper is added as regular equipment. All of the hardware has been improved in quality and finish and on the seven-passenger sedans arm rests have been provided for the rear seat passengers. The upholstering on this sedan is mohair plush.

A factor in the improved appearance of the cars is to be found in the improved sheet metal work. The new hood is heavier metal than formerly and has the front as well as the rear edge turned over for stiffness. The hood clips have leather anti-rattle features, preventing metallic contact. They are held in place also by springs which exert pressure in such a way as to help in the maintenance of quietness. The front and rear fenders are of new crown and bead design. The over-all width of the fenders has been increased ½ in. on the side making the over-all width of the car 67 in. The rear fenders are extended further down in the rear to give better mud protection.

Outside of these changes which have been enumerated in detail the Buick has not been altered and the same mechanical construction which has been previously described in this publication are maintained. The Buick engine has not been altered materially in a number of years, the only change last year being the introduction of a dust cover over the valve mechanism and some improvements in the lubricating system.

Dealers in New Orleans Are Making Plans for Winter Show

New Car Display Is a Certainty, With Possibility of a Used Car Exhibition

NEW ORLEANS, LA., Aug. 14—The New Orleans Automobile Dealers' association, comprising rather more than 98 per cent of the dealers, distributors and equipment men of the city, are beginning to talk about and lay plans for the winter show. Last year's show was highly successful, there having been a week of passenger car exhibition and three days of truck and tractor show. F. C. Bowman was chairman of the committee in charge of the passenger car exhibit and Fred Oster handled the truck and tractor show. Sales from the floor exceeded $200,000, and there was much expression of the hope for a used car show.

Since that time the rising price of gasoline and the difficulties placed in the way of obtaining loans for purchases of cars have increased the demand for used cars and the public seems to want to be shown the used car, its utility, its advantages and the relative prices of the different grades of usage. It now seems probable that the dealers will answer this demand with a used-car show. The new car show is a certainty.

More attention will be paid this year than ever before to trucks and tractors, while the equipment men are taking even more interest than they did last year, and their exhibits doubtless will be much larger and more varied than ever seen at previous shows in the South. The main difficulty confronting the dealers at present is the lack of a suitable auditorium in which to hold the exhibition. A movement was started among the dealers last year for the construction of an auditorium capable of holding at least 7,500 to 10,000 people but sufficient interest could not be aroused to start construction.

Chicago Joined With Twin Cities by Daily Air Service

Bombing Plane Arrives at Fort Snelling After Covering 365 Miles Without Mishap

MINNEAPOLIS, Aug. 13—Daily air mail service between Chicago and the Twin Cities will begin Aug. 16. The first delivery of 30,000 letters took place Aug. 10 when a Martin bombing plane arrived from Chicago, carrying also four pilots learning the route. The landing place is the old Speedway at Fort Snelling, about equi-distant from the postoffices of the two cities. Walter Smith was pilot. Andy Gump was passenger. The plane took off at Chicago at 7.30 a. m., reached La Crosse at 10:13 a. m. and after a reception lasting until 12:10 p. m. it continued to Twin City Field arriving shortly after 1 o'clock. In 23 minutes the Minneapolis mail was being distributed at the postoffice. The air distance is 365 miles.

As a result of the efforts to get the landing field for the government and hangars to cost $17,000 the Twin City Aero Corp. was formed by members of the individual aero clubs, with six directors from each of the central business organizations of the two cities. There are now two hangars, each 79x100 accommodating five planes. With its old 100 foot concrete 2 mile racing track the site is well marked for airmen. The area is 100 acres.

The Minnesota Aeronautical Association now has been formed by representatives from St. Paul, Minneapolis, Duluth and the University of Minnesota, to encourage development of commercial aviation and laws to advance aeronautics.

Bankers to Hear of Trade Needs at Association Picnic

Ohio Organizations Cooperate in Launching Publicity Campaign—F. E. Moskovics to Speak

COLUMBUS, Aug. 14—The campaign to carry the message that the automobile an dmotor truck are necessities and not luxuries has not yet started in central Ohio although rather elaborate plans have been made for such a campaign. This campaign will be conducted under the auspices of the Columbus Automobile Trade Association of which Y. B. Jones is president and Charles Magruder, secretary.

The annual picnic and outing of the association is to be held at the Elmont hotel, Groveport, Aug. 26, when the campaign will be launched. All the leading bankers of the city have been invited to attend and in order that there may be a large attendance of them the hour for the beginning of the picnic has been set for late in the afternoon. The principal speaker will be F. E. Moskovics, vice-president of the Nordyke & Marmon Co., who has been speaking along the line of automobiles as necessities and will explain what the country at large owes to the automobile industry.

Following the picnic steps will be taken for an extensive publicity campaign in cooperation with the Ohio Automobile Trade Association.

The local association is composed of about 85 per cent of the dealers in the city as well as other persons interested in the trade.

To meet the need of the city, San Francisco has been getting milk from greater and greater distances. Large quantities were collected from the farming region about Soledad and shipped from that centre by railroad. But no refrigerator cars were available and the milk arrived in poor condition. Now the milk is brought by a five ton truck and trailer over the hills for this long distance. There were prophecies that the milk would be churned, but it has arrived with the 2600 gallons of milk at a temperature of less than 50 degrees—too cold to spoil or churn. This low temperature was maintained by carefully packing cans with wet sacks which are wet again enroute. It has been proven to be cheaper than the old method of expressing and rehandling. The method in which the load is brought over the San Juan grade is interesting. At Salinas the trailer is taken in tow by a five ton contract truck without load, which pulls it over the grade to San Juan. The down grade is negotiated on compression by both trucks with perfect safety. The milk reaches San Francisco every other night

FIRE DESTROYS TRUCKS

Buffalo, Aug. 13—Forty new form-a-truck outfits, the property of the Grace Motor Company of Toronto, Ont., were destroyed when fire swept the storehouse of the Jersey Storage Company here. The loss, of which the trucks formed a considerable part, was estimated at more than $150,000.

Clearing House for Employees Opened by Dealers Association

Repairmen, Chauffeurs and Mechanicians Registered — Chicago Agency Proving Success

NEW ORLEANS, LA., Aug. 14—To give increased and better service to owners of automobiles, without cost to the latter, the New Orleans Automobile Dealers association, which inclues more than 98 per cent of the dealers and distributors in the city, has opened a clearing house for car mechanics, repair men and chauffeurs.

All the New Orleans automobile owner needs to do today to get a registered chauffeur or mechanic, or all the garage man has to do to get a first-class repairman or mechanician, is to telephone T. B. Moody, assistant secretary of the association, and a man will be sent to him.

All these workmen are registered by Mr. Moody and their records for at least two years past investigated. They must have a clean slate or they cannot register with the association. Workers registering are classified as to experience, ability, past performances, reason for leaving various previous employers and so on, so that the new workers' clearing house eventually will have a record of virtually every automobile mechanic and chauffeur in the city, on file for the inspection of employers. No charge is made to either side, but the employer is requested, at the end of a month, to report on the character and ability of the man furnished him.

Chicago, Aug. 14—The Chicago Garage Owners Association has met with great success in its agency for the employment of mechanics. The work is in charge of the secretary, Mrs. G. H. Steineck, formerly a garage owner and is familiarly acquainted with the problems facing the employer. Members of the association do not employ a man for his garage until his past record as to dependability, character and workmanship are investigated by the association officer. The result has raised to a high standard the personnel of garages.

BRUSHES AND HOW TO TAKE CARE OF THEM

(*Continued from page 17.*)

These storage receptacles are called brushkeepers. The level of the liquid in the keepers should be such that the hair of the brushes is entirely covered. The one holding water should be at least dust tight while the one containing the varnish should be air tight. The liquid should be strained or changed and the keeper cleaned occasionally in order to insure clean storage. The sediment from the brushes will collect at the bottom and care should be used that the brushes do not rest in it.

To keep the varnish in the keeper from skimming over a little turpentine can be added. This will not mix but will form a coating on the top that will protect it from the air. In removing the brush from the keeper some of the turpentine will necessarily be picked up by the brush, and as its presence is very undesirable due precautions must be taken to see that the brush is first well scraped out on the side of a varnish cup, and then well worked out in a little fresh varnish. Varnish used in this way for cleaning a brush should never be used except on chassis work. A special receptacle is generally provided and the varnish poured back after being so used. It is known as "pour back" varnish. Varnish left over after completing a job should be used for cleaning the brushes and then added to the "pour backs." It should never be returned to the original can.

If it is desired to remove a brush from storage and lay away dry, clean it well with gasoline or turpentine, then work out in a little raw linseed oil. Wash with lukewarm water and soap until all of the linseed oil is gone, then rinse with clean water, dry, and lay away with hair well straightened out.

Brushes that have dried up with a quick drying material never can be restored to their original condition. The use of paint and varnish remover will soften them up and permit of their being used for cleaning, etc., but their original snap and life is not there.

There are two articles used by the automobile painter familiar to every service man, but not every service man knows of their history, and a few facts regarding them will prove of interest perhaps. The articles are sponges and chamois skins—used far more religiously by the automobile painter than by the automobile washer.

There are many different types of sponges but the Rock Island Sheepswool is acknowledged to be the best, because of its toughness and ability to hold the most water. The sponge as we know it is but the skeleton of the animal that once lived at the bottom of the ocean. Most of the sponges used in this country come from the waters around Florida, Cuba and the Bahamas.

What is known on the market as a chamois skin is really an oil tanned sheep or lamb skin lining. After the wool is removed from the skin it is thoroughly cleaned and then split. The outside or grain side is not suited for chamois leather. It is tanned with oil and then finished by placing it against a revolving wheel covered with emery or flint. A good quality of chamois will throw off water very readily and after drying will not harden or crack.

RECEIVER FOR PALMER TIRE

Detroit, Aug. 13—Curtis Gray, of Muskegon, has been appointed temporary receiver of the Palmer Tire & Rubber Company of St. Joseph on application of creditors who allege the company has liabilities approximating $106,000, with assets of $46,000. A hearing will be held in St. Joseph August 24, to determine whether the receiver shall be made permanent. The company has been in business about five years.

Steel Frames for Automobile Bodies Are Held Not Dutiable

Contention Upheld That They Require Added Manufacturing Processes to be of Value

WSHINGTON, Aug. 10—Decision of the Board of General Appraisers announced here to-day that steel frames for automobile bodies are not dutiable may have a stimulating effect on the importation of these articles. The decision of the collector at the port of Detroit classifying the merchandise is accordingly reversed.

The Board ruled in the matter of the protest of John V. Carr, an importer, against the assessment of duty by the Detroit collector. The question concerned steel frames for automobiles assessed for duty at 45 per cent under paragraph 119 as automobile bodies, and claimed to be dutiable at the 15 per cent rate as manufacturers of wood not specially provided for. Seven witnesses mostly officials of the Dort Motor Car Co. were called by the importer to sustain his claim these articles are merely the frames of automobile bodies, which require considerable further manufacturing processes before the trade would recognize or accept them as automobile bodies. This contention was formally recognized by the Board.

The Board describes steel frames for automobile bodies and holds them assessed as follows: "Frames which enter into the construction of automobile bodies; that, being composed in chief value of steel not plated with gold or silver, they are properly dutiable at the rate of 20 per cent ad valorem under paragraph 167 of the act of 1913 as manufactures of metal not specially provided for."

BODY BUILDERS REORGANIZE

Columbus, Ohio, Aug. 15—A complete refinancing and reorganization of the John Immel & Sons Co., of Columbus, manufacturers of closed bodies, has been announced and steps have been taken to bring the product of the factory up to a high point. By the reorganization, Allen F. Beck is president and general manager; George M. Sunday of Chicago, vice president in charge of sales and operations; Minor Wilson, secretary; Roger B. Allen, treasurer; V. L. Decker, production manager, and W. M. Miller, assistant general manager.

The company is just completing a large modern plant here which has approximately 240,000 square feet of floor space. The company has booked large contracts for closed bodies from the Liberty, Velie and National companies.

MOTOR TRADE TAXED

Wilmington, Del., Aug. 12—An ordinance has been introduced in the city council proposing annual tax for municipal purposes on various industries. The following items affect the motor trade: Public garages, $15; automobile accessory dealers, $15; dealers in bicycle supplies, $10.

Louisiana Pipe Lines Pass To State as Common Carriers

Standard Oil Co. Must Accept for Transportation Oil of Independents Up to Its Capacity

NEW ORLEANS, LA., Aug. 13—Oil pipe lines throughout Louisiana became common carriers in the view of the law, August 9, under provisions of a law enacted by this year's session of the state legislature. All these lines now come under control, supervision and regulation of the state railroad commission.

The bill as passed into law came at the end of a long fight between the Standard Oil Co. of Louisiana and the independent oil producers of north Louisiana. The independents claimed—and proved—that the nature of the business conducted by the Standard proved the corporation lines to be common carriers, while the Standard contended that its pipe lines were private property. The term "common carrier" as defined in the law, now includes "persons, firms or corporations engaged in the transportation of crude petroleum for hire, or which may be held legally to be such from the nature of their business."

The advantage of the new law, and the result of it is that it compels the Standard Oil Co. to accept for transportation through its pipe lines all oil offered by any company, up to the capacity of those lines. Prior to the enactment of this law, more than 300,000 barrels of crude oil were lost, after the producers of North Louisiana had pumped it out of the ground, because the Standard company refused to transport it through its pipe lines.

Now that these pipe lines have been made common carriers, the independent producers will have an outlet for their oil and it is expected that fully 17,000 barrels more a month will be offered for sale in the markets of the country. While this is a small amount, compared to the total production, development of the north Louisiana fields, which had come to a standstill owing to the embargo placed by the Standard pipe lines, already has been renewed, and other wells are being brought in, furnishing still more oil for the general market.

Since an outlet has been forced for this independent oil, capital has been offered for the establishment of two refineries, one at New Orleans and the other near Shreveport, in the Caddo field, the largest producing field in Louisiana.

Carrying Revolvers in Cars Against Missouri State Law

St. Louis, Aug. 14—The Missouri Supreme Court has held that it is a violation of the law against carrying concealed weapons, to carry a revolver in the side pockets, under the seats or in other places of concealment in automobiles or other vehicles. The decision was handed down in the case of the State vs. Conley, on appeal from Adair County. N. J. Conley, the defendant, was arrested for carrying a revolver concealed on the seat of his wagon and fined $100.

The Supreme Court held, among other things: "Under the statutes defining this offense, the concealment, although not actually on the person, may be in such close proximity to the accused as to be within his reach and convenient control; and upon proof of this fact the offense is made out."

Heretofore it has been impossible to obtain convictions of persons found with weapons in automobiles.

Tractors in Operation Feature Farmers' Day Demonstration

Wilmington, Del., Aug. 12—Farm tractors in operation contributed one of the chief features of interest at the annual farmers' day demonstration on the Delaware state experiment farm, at Newark. Two of these machines, in the hands of experts, were put through various tasks to show their adaptability to farm work and the speed with which they accomplished these tasks.

It is the aim of the station not only to instruct the students at Delaware college, with which it is connected, but also to disseminate the education among the older farmers of the state, showing results and how they are accomplished. In order to do this there is a farmers' day each year, when farmers from all over the state are invited to come to Newark. They are treated as guests, provided with refreshments, shown all over the place and given demonstrations in work that especially interests them.

EUROPE WANTS OIL TRACTOR

Washington, Aug. 16—American commercial attaches have reported to the Department of Commerce on the increased use of motor ploughs in European countries. According to information obtained from Swedish manufacturers, tractors are now in general demand in European countries which will use crude oil instead of petrol or benzol.

The number of Swedish tractors manfactured for Austria continues to grow. European countries have been importing these machines in large number principally because of the cheapness of operation. Gasoline which is ordinarily used in tractors made in this country, must be imported and the high costs of fuel hinder the sales of this equipment.

PISTON RING SALES STEADY

Baltimore, Aug. 14—An indication that the repair shops of the trade are enjoying a good business is found in the way piston ring sales are holding up. According to Sales Manager Walter P. Coghlan, the American Hammered Piston Ring Co. is manufacturing, selling and delivering 1,750,000 rings a month, which figure it has steadily maintained for at least a year.

Investigation Shows Evidence of Gasoline Adulteration

Bureau of Mines in Second Semi-Annual Survey Reports Indications of Careless Refining

WASHINGTON, Aug. 13—Analytical results of the second semi-annual gasoline survey conducted by the Bureau of Mines show that there has been a greater decrease in the volatility of motor gasoline than can be accounted for as the normal change from winter to summer quality. These findings apparently bear out the contention of automobile manufacturers and dealers that the low grade gasoline now being sold throughout the country is chiefly responsible for the complaints made by automobile users.

Samples of motor gasoline were collected from seven cities to obtain a grand average for the country. Judging from the eighty-two samples there were many evidences of adulteration with kerosene. Likewise, the federal investigators found many samples indicating very careless refining if not actual adulteration. From a standpoint of an increase in the average boiling point of the gasolines San Francisco ranks first in quality. The average boiling point of this product in the Pacific coast city is 270 degrees Fahrenheit; New York ranked second with a standing of 272 degrees Fahrenheit; Pittsburgh and Chicago were tied for third place; Washington, New Orleans, and Salt Lake City had the poorer grades of gasoline.

The reason for the failure of automobile engines to function properly is explained in a statement from the Bureau of Mines that samples of motor gasoline were found which contained so much high-boiling material that it was impossible to determine the end point by means of the standard distillation thermometer which covers a range up to 518 degrees Fahrenheit.

EFFORT REDUCES TAX

Bloomington, Ill., Aug. 13—Value of organized effort was demonstrated here recently in connection with an ordinance passed by the city council which placed a tax of $100 annually upon each gasoline filling station. Immediately after the passing of the ordinance became known the Bloomington Automobile & Tractor Association, composed of dealers, called upon the council in a body and stated that owing to the narrow margin of profit in selling gasoline the tax was felt to be a great hardship. The result was that the tax was reduced to $25.

The La Fayette, manufactured by the La Fayette Motors Co., Indianapolis, will be handled in Philadelphia by the La Fayette-Philadelphia Co., which has been organized by Edwin Hyneman and Robert M. Drayton. Gerrit M. Judd, formerly with the Foss-Hughes Co., Pierce-Arrow distributors in Philadelphia, will act as general sales manager.

Bankers Committee Takes Charge of Maxwell Motors

Walter P. Chrysler Heads Management but Merger With General Motors Is Denied

NEW YORK, Aug. 13—Early return to normal operating conditions at the Maxwell and Chalmers plants is forecast as the result of action taken this week by all the interests connected with the two companies. These were the more important developments in the somewhat complicated situation.

1.—Bankers for the Maxwell Motor Co. have advanced between $3,000,000 and $4,000,000 to tide it over until its affairs are reorganized on a permanent basis.

2.—The affairs of the Maxwell company will be worked out by a management committee headed by Walter P. Chrysler, executive vice president and general manager of the John N. Willys interests. He will be assisted in financing and reorganization plans by J. R. Harbeck, vice president of the American Can Co., who also is closely allied with the Willys interests.

3.—Because of existing conditions in the financial and business world the joint committee representing the Maxwell and Chalmers companies has extended indefinitely the time for declaring operative the agreement under which the two companies would merge.

4.—A new general manager will be employed for the Maxwell company which is operating the Chalmers plant under lease. This man has not been selected and the final choice will rest with Mr. Chrysler.

Formal announcement of the temporary arrangement has been made by the bankers in a formal statement which said:

Financiers Assume Control

"Rumors of difficulties surrounding the Maxwell Motor Co. and the closely allied Chalmers company are set at rest by announcement made today to the effect that a strong group represented by prominent financiers and leading factors in the automobile industry, have taken hold of the company's affairs.

"It is stated that failure to promptly ratify the negotiations which have been for some months pending between the Maxwell and Chalmers interests has resulted in the postponement of the company's definite financial plans and that this has been responsible for the rather serious condition recently confronting the company. Assurances are given that with the joining of strong financial interests to the enterprise and the settlement of the negotiations between the two corporate interests there will be a speedy return to normal operating conditions.

"The affairs of the company are to be worked out through the medium of a management committee representing all interests. The committee is headed by Walter P. Chrysler, formerly vice president of the General Motors Corp. and the recognized leading authority on automobile production. J. R. Harbeck, vice president of the American Can Co., who is also closely allied with Mr. Chrysler in his various enterprises is a member of the committee having to do with financing and reorganization plans. Other members of the committee are George W. Davison, president of the Central Union Trust Co. of New York; B. F. Everett of Detroit; E. R. Tinker of the Chase National Bank of New York; Ralph Van Vechten of the Continental and Commercial National Bank of Chicago; James Leo Butzell representing the First and Old Detroit National Bank and other Detroit interests, James C. Brady and Hugh Chalmers."

It will be noted that this statement avoided reference to the fact that Mr. Chrysler and Mr. Harbeck were associated with the Willys interests. While one of the leading figures in the Willys group, Mr. Harbeck has no other automobile interests, so far as known, and it was the not unnatural assumption that the association of the two men with the Maxwell-Chalmers combination presaged another addition to the Willys enterprises. This assumption was vigorously denied today, however, by the banking interests involved. They said they sought the services of Chrysler because of his genius as a producer and those of Harbeck because of his recognized financial ability. To allay what they termed "any misunderstanding," the banking group gave out this statement:

No Willys Combination

"The new management committee of the Maxwell Motor Co. states that Walter P. Chrysler, who has recently become associated with the committee in connection with Maxwell Motor Co. affairs, has in no way discontinued his active connection with Willys-Overland. Mr. Chrysler continues as executive vice president and general manager of the Willys interests. Owing to the important and successful work he has done in Willys-Overland, he has been asked by the banking interests to be a member of the committee recently formed to adjust the Maxwell affairs. This adjustment has nothing whatsoever to do with any of the Willys companies and no combination of Willys and Maxwell interests is contemplated."

An almost identical statement was forthcoming from the Willys executive offices. A similar assertion was made at the offices of Harbeck. Unless they are represented by Mr. Harbeck and Mr. Chrysler the committee does not indicate that any new financial interests have become connected with the Maxwell enterprise. It is assumed that those referred to in the bank statement are the banks themselves for they are the heaviest creditors of the Maxwell company. The merchandise creditors are represented by Mr. Everett who has been mentioned as the new general manager to succeed C. C. Hanch, but who declined the post. The Brady interests are heavy holders of Maxwell securities and Chalmers is the sole representative of the Chalmers company on the committee.

Early announcement is expected of the reorganization plans. The joint committee headed by Harry Bronner, representing the Maxwell and Chalmers companies, says:

"The committee has been in conference with financial and business interests as well as with creditors of the Maxwell company regarding plans for the supply of new money urgently required for the readjustment or reorganization of the Maxwell and Chalmers companies and the management of their respective properties. The committee believes that in the near future a modified plan, the general features of which have already received the approval of the interests consulted, may be formulated for the approval of certificate holders and creditors."

After explaining that the life of the merger agreement has been extended indefinitely, the committee states that holders of certificates of deposit may withdraw from the plan at any time before Aug. 31 but not after that date.

B. A. Lyman Now President Maxwell Distributing Corp.

Organization to Handle Sales and Service in New York Territory Effected

NEW YORK, Aug. 13—The Maxwell Distributing Corp., organized to handle Maxwell and Chalmers sales and service in New York territory, to-day elected B. A. Yyman, president, Harry J. De Bear, vice president and general manager and Walter M. Anthony, treasurer. Mr. Lyman is director of sales of Maxwell Motor Sales Corp., Mr. Anthony is treasurer of the same company and Mr. De Bear for several years has been manager of its New York branch. The distributing corporation succeeds the branch as New York representative and will operate practically as a distributor of Maxwell cars and trucks and Chalmers cars. Hitherto, Mr. De Bear, as branch manager, has managed sales in the territory but service has been under direct control of the factory.

G. M. C. Reported Negotiating For Timberland in Wisconsin

Milwaukee, Wis., Aug. 16—General Motors Corp. is reported to be negotiating for large tracts of timberland and a site for a vast establishment in the heart of the hardwood belt of Northern Wisconsin and Upper Michigan to be the source of its supply of all wood and wood stocks. The announcement that negotiations are pending follows the news that the Ford Motor Co. has started work on a large sawmill, planing mill and body stock factory at Ironwood, Mich., to furnish all wood required by its main and assembling plants. Norway, Mich., is reported to be the center of the proposed General Motors enterprise. Like the Ford acquisitions, the General Motors prospective holdings include water power site, lands containing iron and copper ore, besides vast areas of timbes.

Use Increased Gas Cost to Set Forth Economy Feature of Cars

Dealers Avail Themselves of Opportunity to Capitalize on the Merits of Makes

LOS ANGELES, Aug. 7—The retail price of gasoline went to 27 cents a gallon here to-day. That figure has been quoted by some companies for a week but it was not until to-day that the Standard and Richfield made an advance from 25 cents. In all the surrounding cities and towns the retail price is 1 cent higher than it is here.

Trainload shipments of gasoline are arriving here almost daily from Texas and Oklahoma. More than 2,000,000 gallons already have been brought in. It is the contention of the importing companies that even with the increased price they are not making as much money as they did formerly when their stock was made up from local production.

As the result of higher prices almost all locally prepared advertising copy is directed to setting forth the gasoline economy feature of motor cars. Dealers see in the situation an opportunity to capitalize on the merits of their make of cars.

Interests Join to Form New Automobile Supply Company

Kansas City, Aug. 14—W. H. Storms, president of the Storms Sales Co., accessory dealers, A. J. Stephens, president of the Stephens Rubber Co., this city, and W. L. Beckley, president of the Beckley-Ralston Co., Chicago and New York accessory jobbers, have incorporated the Storms Auto Supply Co., for $100,000 which will take over the stock of the Kansas City branch of the Beckley-Ralston company. The company will engage in both wholesale and retail accessory trade, maintaining a staff of salesmen on the road. Mr. Storms will continue as president with Mr. Stephens as vice president. The secretary-treasurer will be M. W. Klein formerly connected with the Storms firm.

One Cent Increase a Gallon For Gasoline In South

New Orleans, Aug. 14—The price of gasoline has been raised again beginning Aug. 1, to 29 cents, an increase of one cent. The Louisiana-Mississippi Automotive Trades association, the largest organization of automobile, truck, tractor and marine engine dealers, distributors and users in the South made an extensive investigation of gasoline conditions during June and July and has issued a statement refuting the claims of the oil companies that the increase is justified.

J. H. Duncan, secretary-manager of the association, terms the advertising campaign which the oil companies are carrying on to explain their reasons for raising the price of the fuel as "purely psychological and intended to prepare the minds of the people for this and other price increases which are in no sense warranted either by the supply of gasoline or the demand for it, or the prospective supply."

Steam Driven Motor Bus Line to Be Operated in Kansas City

Kansas City, Aug. 13—Steam driven motor busses with a capacity of forty to fifty passengers will soon be operating here according to officials of the Kansas City Jitney association who are now selecting the type of bus to be used. The selection is being made with the view of standardizing motor bus traffic and making the bus the principal means of surface transportation here.

The steamer has been favored in the selection and the body will be a double decker with upper deck enclosed. The association will select its type of engine and body and will have the machines built on contract. F. M. Roberts, president of the association, said that without solicitation the association has received promises of sufficient financial aid to make the line successful.

NEW TIRE FACTORY IN SOUTH

New Orleans, La., Aug. 13—The Standard Rubber Company, capitalized at $5,000,000, will erect a factory for the manufacture of automobile tires in New Orleans by January 1, 1921, according to the announcement of I. J. McGee, secretary and general manager of the new company. The corporation was formed to manufacture a new puncture-proof automobile tire, invented by G. W. Gish, superintendent of the Doss Tire Company, of Atlanta. The puncture proof feature is in the casing, which is airtight, and consists of several layers of alternate rubber and fibre, lined with a black rubber composition, about one-fourth of an inch thick, soft and pliable, which stretches some distance before giving way to any hard substance entering the tire.

URGE UNDERGROUND FUEL STORAGE

Cincinnati, O., Aug. 16—Underground storage of oil and gasoline tanks in Ohio is again being urged by Edward Steinway, superintendent of the Fire Prevention Bureau, as the result of a gasoline tank explosion and the resultant loss of life of four firemen at the filling station of the Refiners Oil Co. here.

"The explosion is an argument for any contention that all storage oil and gasoline tanks should be underground and incased in concrete," said Steinway. "If one wishes to store 50 gallons of gasoline in a tank, it must be underground, but oil companies are permitted under Ohio laws to store their gas and oil in huge tanks above ground."

Hanson Motors Planning For National Distribution

Now Producing 25 Cars Daily and Making Arrangements for Increased Factory Room

ATLANTA, GA., Aug. 11—After having been engaged in organization work and the development of a plant since 1917, the Hanson Motor Co. is now in position to produce 25 cars a day and is at present turning out 12. Until now its output has been absorbed mainly in the south but it now plans to establish a national distribution. The Allen-Waring Co .in New York, Jordan Motors Co. in Baltimore have recently taken distributing agencies. An order for 150 cars has just been received for South America.

The car sells for $2,165 and one of its features is the large amount of aluminum that is used. O. R. Randall, formerly of the Case company, who joined the Hanson company in March as assistant secretary-treasurer, states that 37 acres have been secured adjacent to the factory and will be used for home building as soon as building conditions improve. A dividend of four per cent on the common was paid for the first six months and the six per cent due for the year on the preferred has also been passed on to the stockholders.

Railroad Rate Increase Is Viewed Cheerfully By Akron

Akron, O., Aug. 12—The coming advance in the freight and passenger rates on the railroads is regarded in Akron as a good omen for the automotive industries. It is contended that the motor truck will be in greater demand than ever before for short haul consignments, and the passenger car will be used by commercial houses to a greater extent than ever before for the use of their traveling representatives, all this being reflected in an increased demand for the product of the tire factories. Again there is optimism in the theory that the railroads, with increased revenues, will be in better condition and with the railroads in a prosperous state the entire country feels the benefit.

Amesbury, Mass., Aug. 9—The Walker Wells Company of Amesbury, one of the largest manufacturers of automobile bodies in the east, has been reorganized.

TIRE COMPANY ENJOINED

Wilmington, Del., Aug. 14—In the United States District Court here Judge Hugh M. Morris has handed down a decision granting a preliminary injunction in a suit brought by the Willys-Overland Co. against the Akron-Overland Tire Co., Inc., a Delaware corporation. The plaintiff, in the bill of complaint, objects to the use of the word "Overland" in the name of the defendant, holding that it constitutes unfair competition.

Co-ordinate Truck Tonnage To Relieve Freight Congestion

Civic and Commercial Organizations Join Movement Instituted by Automobile Parts Company

NEW ORLEANS, Aug. 6—The truck tonnage of New Orleans is being assembled and co-ordinated with a view to relieving the local freight jam and the over-congested condition of freight warehouses, both rail and waterfront, here. A plan developed by H. N. Siegel and Walter Betz of the Frank Weinberger Auto Parts Co., is being put in operation to clear up the depressed commercial condition resulting from the partial tie-up of freight which should be moved immediately.

Railroads Agree to Help

The first potential unit is organized, consisting of 150 trucks equipped with drivers and helpers. The draymen are to receive regular compensation from the merchants whose freight they move at the regular rate, the Weinberger company acting as a voluntary clearing-house to bring the truck-owners and the merchants together and receive the money from the merchants and pay it to the truck-owners. Railroad officials have agreed to help in every way possible to notify merchants promptly of shipments and to aid the trucks in getting to stored goods, to loaded freight cars or warehouses immediately. Water shipping agencies have agreed to help in the same manner, and the second unit, also of 150 trucks is about half completed.

The Association of Commerce, the Joint Traffic Bureau, the Board of Trade and other civic and commercial organizations, have joined with the company to complete the organization of the draymen and their trucks into units which, centrally directed, can move the congested freight much more rapidly and more effectively than the separate draymen each working for himself. The merchants of the city are satisfied with the work already accomplished by the first unit. The Association of Commerce called a meeting of draymen, merchants, railroad officials and others interested, at which the plan was fully explained by Messrs. Siegel and Betz, and arrangements were made for the signing up of all the truck operators of the city.

Dealers Back Of Move To Correct Truck Mirror Law

Louisville, Ky., Aug. 9—Suit to annul the recently enacted state law requiring mirrors on driver's seat of all motor trucks has been filed in the Circuit Court at Frankfort by Albert Terstegge, president of the Louisville Automobile club, and Lyman Graham, a taxpayer of Frankfort. The suit is backed by the Louisville Truck Dealers' association.

"The present law requires the owner of a truck to buy a mirror from the state when he obtains his automobile license," Mr. Terstegge explained. "It was not intended, of course, but under the present phrasing the owner would be forced to buy a new mirror each time he obtained a new license and would have to buy one this time whether his car already was equipped with one or not.

"The money, which is about to be spent for mirrors, would come from the road fund. If the law should be thrown out after these are bought the cause of good roads would suffer to the extent of the price of all those unsalable mirrors."

THIS DEALER GETS MONEY

Des Moines, Iowa, Aug. 13.—At least one Iowa automotive dealer has found a way of getting co-operation from banks in these times of tight money. His methods, though drastic, were highly effective.

When his home town bankers began to tighten up this dealer went to the banker with whom he had always done business and asked for assistance for himself and his customers. It was not forthcoming.

The dealer had lived in the town for years and had a pretty good idea of its citizens who were depositors in this particular bank. He took time to write out a list of men whom he knew to have savings accounts in this bank. Then he began to approach them one by one.

His conversations ran something like this:

"You have a few hundred dollars on deposit at the bank, haven't you?"

"Yes."

"It's drawing four per cent interest, isn't it?"

"Yes."

"I have some good farmers' notes here on tractors and cars. They'll pay you eight per cent and I will personally guarantee every note. Don't you want to double your returns?"

The depositors were business men. They knew the dealer and had confidence in him. They also knew the notes were A-1 and they saw the light.

In not more than two or three days the banker began to feel the effects.

Finally after a good many savings deposits had been removed he asked the dealer to come to his office. Then he asked for an explanation of what was going on.

The dealer's answer was short and to the point.

The banker saw the point and was ready to call off the embargo.

"Don't do any more of this business with my depositors. Come in and I will handle your paper as usual."

And in at least one town the war was over.

Milwaukee Ordinance Favors Trucks With Pneumatic Tires

More Speed Is Possible Per Hour When So Equipped—Dealers Help in the Adoption

MILWAUKEE, WIS., Aug. 16—A new ordinance regulating the capacity, dimensions, load, speed and equipment of motor trucks, tractors, trailers and wagons has been adopted by the Milwaukee common council and is now in effect. It is based on provisions in similar ordinances in effect at Cincinnati, Philadelphia and other large cities. One of the most important features is that it permits trucks with pneumatic tires to operate at 15 m.p.h., while trucks with two or more solid tires are limited to 12 m.p.h. Other provisions are that every truck must be equipped with a speedometer; undergo weekly inspection of brakes; carry the name of the owner or operating concern on both sides, with distinguishing number for fleets.

We'ght Limits Defined

The maximum gross weight of vehicle and load combined upon any axle must not exceed 24,000 lbs. The maximum length of a truck is fixed at 30 feet, and with trailer, at not to exceed 70 ft. The maximum width is fixed at 115 in., excepting in case of loading with hay, straw or similar loose material. The commissioner of public works is empowered to prohibit the moving of any load over public streets or alleys when the load produces a weight in excess of 400 lbs. per sq. in. of tire. Police officers are authorized at any time to direct drivers of trucks to the nearest public or private scale to determine if the load and vehicle exceed the maximums prescribed in the regulations.

The ordinance was adopted after conferences between the judiciary committee of the common council and representatives of the Milwaukee Automotive Dealers' Association, Motor Truck Drivers' Union, Transportation Association of Wisconsin, and owners of fleets of trucks. It was made agreeable to all elements and is regarded as a model regulation of the kind.

Truck Building Held Up by Trouble in Getting Material

Appleton, Wis., Aug. 16—The Reliance Motor Truck Co., Appleton, Wis., manufacturers of motor trucks and axles, has reorganized its official personnel as follows: President and general manager, A. G. Brusewitz; vice president, Charles Schmidt; secretary, Henry Huplauf; treasurer, W. G. Jamison; directors, Harry Leppla, Matt Rossmeissl, Wolford P. Treml, John Herman, William Geenen. The company has experienced some difficulty in obtaining certain classes of material, but indications are that the material situation will be sufficiently balanced by Sept. 1 to permit of increasing the present production schedule substantially.

Manufacturers' Convention Takes Up Truck Problems

Association Says People Have Provided Roads Which Must Give Full Value

CHICAGO, Aug. 16—It appeared to be the consensus of opinion at a convention of the Motor Truck Manufacturers Association held at the Congress Hotel in this city that the message of the motor truck as an essential agency in production and distribution should be brought very directly to the attention of the banker whose financial aid is needed to put the industry on a firm footing. The association went on record as endorsing the program of extensive advertising which has been inaugurated by the National Association of Motor Truck Sales Managers and which has had the support of the local secretary of the association, David Thomas, and the truck manufacturers individually.

In bringing the matter to the attention of the banker emphasis should be laid on the fact that the people of the country had voted huge appropriations for the construction and improvement of highways and that vehicular transportation must be provided to make these highways produce their full value.

The convention which is one of a number of informal conferences to bring the members of the association together in close contact for the purpose of discussing individual problems and of exchanging opinions that will aid the individual manufacturer in overcoming obstacles which another manufacturer may have met with and overcome opened with about 25 members present. The association means to be a clearing house of ideas and uses the convention as one of its means. While little action of a decisive nature was taken there was a free discussion of timely subjects.

Other than the question of bringing the matter of financing before the banker the association took up for consideration the subject of patents, different forms of insurance and the uniform vehicle law of which it is strongly in favor.

The association was formed about eighteen months ago but has had headquarters here only for the last four months. It has 28 members of whom ten were taken in at the convention just held. The officers are as follows: President, B. A. Gramm of the Gramm-Bernstein Motor Truck Co.; vice presidents, J. W. Stephenson of the Indiana Truck Corp., and Frank Lujck of the Sterling Motor Truck Co.; secretary-treasurer, M. Cook of the Service Motor Truck Co.

Storage Battery Plate Making For Service Stations

The Associated Electric Service Stations, Suite 412, Standard Trust and Savings Bank Bldg., 105 West Monroe St., Chicago, announce a series of treatises dealing with the subject of storage battery plate making. The announcement is timely as many battery dealers will wish to utilize the idle time of the coming winter days in making up a stock of plates for next season's use.

These instructions, comprising a series of ten treatises, are of a non-technical nature, all abstruse formulae and mathematical problems having been reduced to simple arithmetic and the simplest of easily understood language. These two facts, it is claimed, make the instructions of such simplicity that any battery mechanic can, by following directions carefully, produce very successful, reliable plates.

The subject has been divided up into ten sub-headings in such a manner that it may be studied from any angle, from the simplest to the most complex.

The treatises are numbered from one to ten and are priced from $1.00 to $2000.00, the latter price covering complete plant equipments, Plate Grid Moulds, forming tanke, materials, formulae, etc.

With several of the treatises limited quantities of plate making materials are supplied with instructions for using them. This enables the prospective plate maker to actually paste season and form plates, thus demonstrating to his satisfaction that he can do the work.

Another interesting feature is the no charge consultation, analysis and correction service. This is rendered for periods ranging from thirty days to six months.

The popular idea of "secret formulae and processes" which has found lodgement in the minds of many in the trade is decried. This organization claims to possess no secret formulae but to have been the first to put forth concise, clearly written, easily understood instructions which may be used to produce practical results.

The instructions are not supplied in book form but are written for each applicant separately. This for the reason that it is a personal service, especially designed to fit the needs of each inquirer, which is offered.

This concern was the originator of the Craftsman Master line of small parts moulds for the conversion of scrap lead into new materials, pillar posts, cell connectors, etc., featured in this magazine some months ago. To this line has been added a special demonstration type of plate grid mould which is priced at $35.00 to $50.00.

This latter announcement will prove of supreme interest to those who have wished to engage in plate making but have been deterred from doing so by the somewhat high cost of moulds.

PRICES ON NEW BUICK

The prices on the new Buick cars which are featured in this issue of MOTOR AGE are as follows:

Model 21-44, three-passenger roadster $1795. Model 21-45, five-passenger touring $1795. Model 21-46, four-passenger coupe (118 in. wheelbase) $2585. Model 21-47, five-passenger sedan, $2895. Model 21-48, four-passenger coupe (124 in. wheelbase) $2985. Model 21-49, seven-passenger touring $2065 and Model 21-50, seven-passenger sedan $3295.

Leaders of Industry Look With Optimism to Future

Substantial Companies Strengthen Their Position in Meeting New Demands of Situation

NEW YORK. Aug. 16—While there is nothing tangible upon which to base a more optimistic view of the future, there is evident in financial quarters a more hopeful tone. It seems to be psychological rather than practical but it is shared by many men who have made careful and thoughtful studies of the situation. They believe that if the country can get over the next 60 days safely there will be no more real danger.

The better outlook is not based upon any expectation of a renewal of industrial activity, but rather the reverse. Bankers have hailed with gratification the gradual slowing down of manufacturing activities and they expect this process to continue. It has been gradual and orderly thus far and they believe it will continue to be. Temporary slackening of production is the only means they see to restore something like normal conditions within a comparatively few months.

Banks report a real falling off in demands for new money for commercial purposes and this is regarded as a hopeful augury. This is attributed to a determination on the part of manufacturers to turn their present inventories into cash instead of going into the market for new supplies, except such as are necessary to complete their product. This has served to reduce the volume of their borrowings. As inventories are resumed it is not likely any present attempt will be made to continue production on a large scale.

Unbalanced inventories constitute one of the most menacing factors in the present situation. There are legions of companies which have enormous inventories and very little cash. As fast as the raw materials are turned into finished product and sold, their technical condition improves. Automobile manufacturers were the first to suffer from the inevitable readjustment and they have been the first to make a virtue of a necessity. Almost without exception that have cut their production materially and have effected production economies wherever possible. The consequence of this wise move has been a steady strengthening of the position of the substantial companies.

TO INCREASE ONEIDA PRODUCTION

Green Bay, Wis., Aug. 9—The Oneida Motor Truck Co. is planning an increase of 50 to 75 per cent in production after September 1, when a second unit of its works, duplicating the original shop built about three years ago, will go into operation. Factory No. 2 represents an investment of more than $275,000 and will provide facilities for making radiators, all sheet metal work and some instruments used in the Oneida truck.

Ten Entries Received and Accepted in Elgin Road Race

Several Others Under Consideration by Officials—Historic Event to Be Run Aug. 22

ENTRIES ACCEPTED IN ELGIN ROAD RACE WITH THEIR CARS

W. H. Seymour	Locomobile
Tommy Milton	Deusenberg
Eddie O'Donnell	Deusenberg
Jimmy Murphy	Deusenberg
Ralph De Palma	Ballot
Ralph Mulford	Monroe
Gaston Chevrolet	Monroe
Percy Ford	Frontenac
Cliff Durant	Chevrolet Special
Eddie Hearne	Revere

CHICAGO, Aug. 16—All is in readiness for the Elgin Road Race to be held Aug. 21 under the auspices of the Chicago Motor Club. Ten entries have been accepted officially with the closing of nominations on Saturday night although several others are being held in abeyance awaiting consideration.

Had not the 183 cubic inch piston displacement limit been enforced for this year's race, a much larger field could have been secured. More than a dozen applications for entry blanks have been refused by officials when it was learned that the prospective entrants had cars of last year's vintage. While the field has thus been narrowed down it has gained in class far more than it has lost in numbers for every car in the race has been built in 1920 and all have had tryouts which have proved their speed and stability.

The Deusenberg cars are expected to arrive in the city to-day. The track is ready to receive them having been put into much better shape than for years past.

The distance to be covered at the race covers 30 laps on a course of approximately eight and one-half miles making a total of 250 miles.

The first prize is $6,000; the second, $3,000; third, $1,500; fourth, $1,000; fifth, $500; sixth, $300; seventh, $200. In addition a prize of $100 goes to the driver leading the field at the end of each lap and $10 goes to each entrant not finishing among the first seven.

Points awarded in the A. A. A. championship are: First, 500; second, 260; third, 140; fourth, 80; fifth, 50; sixth, 35; seventh, 25; eighth, 15; ninth, 10; tenth, 5.

ack of Raw Material Cuts Car Company Working Force

Buffalo, Aug. 14.—"The railroad and coal strikes have resulted in inability to obtain raw material," explained Col. George W. Mixter, president and general manager of the Pierce-Arrow motor car plant here, in connection with the recent laying off of between 1200 and 2000 employees. "We have been spending $5000 to $10,000 weekly for expenses of men to keep shipments of raw material moving toward our plant. The men will be taken back as soon as the material shortage can be overcome." A statement issued to the men laid off says the situation is due to basic conditions all over the country and is one over which the company has no control.

One-half of the working force of the Batavia Rubber Co., Batavia, N. Y., has been laid off for periods of one month to six weeks. Officials of the company say this action was taken as there is an overproduction of tires not only by this company but throughout the east. Extensive improvements are to be made to the plant while it is being operated by the reduced force.

Site for Addition Bought by Kentucky Wagon Company

Louisville, Ky., Aug. 13—The Kentucky Wagon Manufacturing Co., through negotiations completed yesterday, has acquired eighteen acres of property on Eastern Parkway at an approximate cost of $50,000. On the new site buildings and extensions to the present plant will be erected involving the employment of over 1000 men and the expenditure of close to $1,000,000. Work on the new addition will be started within the next two years or as soon as the prices on building material show a decline. The acquirement of the new property will make the wagon company plant cover a shop space of about sixty-seven acres with a working force of 1900 men.

R. V. Board, the president, states that the additions will be used exclusively for the manufacture of automobiles, motor trucks and accessories and that neither would the name of the company be changed nor the manufacture of wagons be discontinued.

WILLYS ACQUIRES U. S. LIGHT & HEAT CORP.

New York, Aug. 16—John N. Willys and his business associates have acquired control of the United States Light & Heat Corp. which manufactures storage batteries, an electric lighting and starting device for automobiles and electric lighting and heating devices for railroad cars, in a factory at Niagara Falls. Willys interests already controlled the Electric Auto-Lite Corp. of Toledo with which the Niagara Falls company was closely allied. For that reason the new addition to the chain of Willys enterprises will cause little surprise. As a matter of fact they have had more or less inter-locking directorates.

The new directorate of the United States Light & Heat Corp. is composed of the following: Willys, Walter P. Chrysler, J. R. Harbeck, J. E. Kepperley, J. Allan Smith, E. H. Gold, C. O. Miniger, C. L. Lane, James A. Roberts, J. O. Moore and George C. Shepard. The first four represent the Willys group. Willys has been elected chairman of the board, Gold vice chairman and Smith president.

Federal Bureau Approves Road Projects in South

Large Sums to Be Expended on Construction—Advocate for Better Roads Returns from Tour

ATLANTA, Ga., Aug. 16—Georgia leads all of the six southeastern states in the total amount of good road work approved by the Federal government, according to a report for the district announced by the Bureau of Public Roads, with headquarters at Montgomery, Ala. The district comprises the states of Georgia, Alabama, Mississippi, South Carolina, Florida and Tennessee.

All work in this district is passed on and approved by the Bureau of Public Roads at Montgomery, and the work approved by this bureau is entitled to one-half of its total cost from the federal government.

In the work approved so far Georgia leads with $5,776,240, while Tennessee is second with something over $4,000,000 and Mississippi third with almost $2,500,000.

Project arrangements have been executed between the federal bureau and the highway departments of the six states totaling $12,666,113, Georgia ranking first in this respect with something over $3,500,000. Tennessee is second with about $2,870,000, and Alabama third with about $1,900,000.

Projects already under construction in this district, not including the work already completed, represent an outlay of $2,466,775. Again Georgia ranks first in this respect with $1,130,437; Alabama is second with $443,042; and South Carolina is third with $335,206.

Good road work is progressing as well as could be expected in the district considering the fact that the embargo is still in effect and material can hardly be secured. When the embargo ceases road work will experience a decided impetus in the Southeast.

New Orleans, La., Aug. 16—Louisiana will incorporate in her new state convention which is to be framed at a constitutional convention in February either the Milner or the Dowling plan for the expenditure of $35,000,000 on the highways of the state during the next seven years. These two plans differ so little that if either shows signs of failure its supporters will swing their votes to the aid of the other so that it is certain that Louisiana will have a comprehensive plan for state wide road construction following the constitutional convention next spring.

Col. T. C. Campbell, vice-president of the Jackson Highway Association which is working on a hard-surfaced road from Buffalo to New Orleans has returned to the Crescent City from an automobile tour of Kentucky, Indiana, New York and New England.

Complete Arguments in Case of Moore Motor Vehicle Co.

Question of Jurisdiction Arises in Pleadings Against Appointment of Permanent Receiver

DANVILLE, Ill., Aug. 16—Question of a receivership for the Moore Motor Vehicle Co., of this city, will be settled soon. Attorneys for both sides have completed their arguments and mailed thei rbriefs to Judge English. The principal question to be decided by the court relates to jurisdiction. The counsel for the company contends that the company really is a South Dakota institution and the Illinois district court is without control. The stockholders maintain that there are two companies, one organized under the laws of South Dakota and the other under the laws of Illinois, and that both are sponsored and promoted by the same coterie.

Stockholders announce that they are willing to expend as much as they have already invested to punish those responsible, if the charges are proven. It is charged that some sales of stock were made at the low rate of one dollar per share, while others were made as high as $15 per share. The stockholders have been comparing notes and, it is claimed, learned of the variation in the price. Officers of the company formally deny any variation in the price and assert that if such existed it was not authorized and that the stock salesmen employed were responsible. The officers further assert that misunderstanding among the stockholders concerning industrial conditions, is largely responsible for the unrest and determination to secure a receiver.

Walter V. Dysert, Danville, engaged to investigate the company, made this statement:

"Careful inquiry into the records of the Moore Motor Vehicle Company, indicate that approximately $2,150,000 worth of stock has been sold, yet it is doubtful if the assets will exceed $100,000."

An expert engaged to go through the Danville plant learned that the maximum output would not exceed two cars per day. Because of the heavy overhead expense, every car sold represented a loss of $200 upon each car. In the meantime, James H. Elliot, the temporary receiver, is going over the books and collecting all of the evidence possible concerning the methods of operation, making an inventory of the stock on hand, bills collectible and other assets and liabilities.

Reclaiming Oil

(Continued From Page 13.)

In addition to the dilution which takes place there are several factors that make it necessary to change the oil and clean the crankcase. Along with the dilution comes the accumulation of dirt and this is probably the worst thing we have to deal with. Dirt is held in suspension in the lubricating oil and forms a regular grinding compound that causes rapid wear. The oil also becomes oxidized to some extent and there is a considerable formation of carbon. There is a condition in the crankcase which results in the formation of a grease soap which forms on the side of the crankcase. One of the chief purposes of the crankcase is to cool the oil and it is certain that an accumulation of grease soap on the sides of the crankcase will act as an insulator and prevent proper cooling of the oil.

The entire problem of lubricant, fuel and engine conservation can only be solved by the automotive engineer or designing mechanical engineer providing means and methods whereby the fuel will be entirely consumed on top of the pistons.

The importance of the care of gasoline and lubricating oil must not be overlooked and the useless wasting of even the smallest amount of gasoline or oil per car must be avoided. While the automotive and designing mechanical engineers are developing the internal combustion engine to overcome this trouble, the fact still remains that we have several million automotive vehicles in operation that must cope with the situation.

Changing Crankcase Oil

Since we know that the oil must be changed often because its lubricating properties are rapidly destroyed, yet we cannot afford to change it often and throw the oil away as we are now doing. As a matter of fact it is probably a good thing that the oil is not changed any oftener than it is from the standpoint of oil conservation for if a campaign was started to change the oil after any definite period of operation, it is certain that the lubricating oil supply would soon be exhausted.

How then are we going to overcome this difficulty?

The lubricating oil must be reclaimed.

Now, what are the drawbacks? What are the factors that are interfering with the solution of the problem on this basis?

In the first place there is hardly a dirtier job than draining the crankcase. It is not properly designed so that the oil can be removed readily. In order to drain the crankcase it is necessary to get under the car and remove a drain plug. Consequently the car owner does not change the oil any oftener than he positively has to. Furthermore he does not appreciate the condition of the oil and does not realize that his engine is wearing out very rapidly. The crankcase should be designed so it will carry more oil and so that the oil will have a greater period of rest to allow the sediment to settle.

In the second place, oil reclaimers are rather expensive at the present time. With any product it is very well known that without demand, which is the real stimulant, there is no particular effort extended to develop a cheap piece of apparatus on a large scale. There is no reason why a reclaimer that will give perfect satisfaction cannot be built at slight cost.

As a commercial proposition every service station should have a reclaimer and every individual company operating a truck or car fleet should also have this equipment. It means that the dealer is really the medium through which all of the discordant factors that are interfering can be brought together. It is the dealer who influences the car design because he is the man who meets the conditions of the car in the field. Proper organized demand can force the manufacturer to provide a means of draining the oil that will be as simple as filling your radiator with water. The oil man must also come to the dealer as his means of meeting the demands of the consumer. The consumer must be educated to the necessity of changing and reclaiming oil and also the proper oil to be used for the condition of his engine.

In addition to the fact that oil reclaiming will give wonderful conservation an oil reclaimer installed in a service station should prove a financial asset as well. Have the owner come in and change his oil, and reclaim it for him so it can be used over again.

Oil has always been relatively cheap and because of this fact the car owner has become indifferent in its use. As long as it can be bought for twenty or thirty cents a quart, he will simply use it, think his engine is running perfectly, and about ever so often dump it out and throw it away. This indifference can only be overcome by an active co-operative campaign of education. The subject is so vast that it is impossible to reach the approximately ten million car and truck owners. The dealer is a representative medium through which these operators can be reached.

So far the subject has only been discussed by presenting the facts as they exist and offering a few suggestions as to the methods which must be employed to overcome the unbalanced condition that exists. There is still another great and vital phase of this question which is without doubt the most difficult to overcome and that is the adoption of oil standards, the co-operation of the oil producer, the car manufacturer and the dealer and the education of the consumer. The important and influential part that the dealer can play and a discussion of this phase will appear in a subsequent issue.

SPEED LIMIT TO SAVE ROADS

Hattiesburg, Miss., Aug. 14.—The Forrest county board of supervisors has ordered that speeds on the roads of the county shall not exceed 20 miles an hour and that bridges shall be crossed at not more than eight miles. Citizens are being deputized to enforce the new law, which was put into effect after highway experts and engineers had told the supervisors that the high speeds at which autoists traveled throughout the county was destroying bridges and roads alike. Speed in the towns is limited to ten miles an hour, with an eight-mile limit in the business sections.

A Department of BETTER BUSINESS

Conducted by Ray W. Sherman

CONDUCTED BY RAY W. SHERMAN

A Bizitorial

ONE time a man who wanted to slip a few words of comment into a department store advertisement styled it an "aditorial," so we see no reason why a few words of comment in this Department of Better Business shouldn't be a "Bizitorial."

The subject is that all-important matter of How to Make More Money. Does the subject interest you?

Making more money is, according to those who have made it, not such a very difficult matter, yet a lot of us seem to have some difficulty getting started.

Perhaps a few suggestions may help:

1—Get a big sheet of paper and a pencil with a large, fat lead.

2—Set down the names of the various departments of your business, such as New Car Sales, Used Car Sales, Shop Supplies, Parts, Garage and the others.

3—Under each heading set down these three items: 1—Gross business for a year or month or any other definite period. 2—Cost of doing business. 3—Net profit.

4—If your net profit in any department is less than ten per cent, go over the cost of operation figures carefully to see if they can be cut down. If they cannot be cut down, go over the sale figures to see if they can be graded upward. Figure your profits on this new basis with the old volume of business to ascertain what you can make.

5—Having arrived at a basis which will net a better profit, the next step is to consider ways of getting new business. Perhaps added sales of cars will bring added profits. Perhaps there are revenues from the shop or garage which can be increased.

6—The important move is to get the whole business down on a sheet of paper. Until it has been set down on a sheet of paper you cannot get a good idea of it, and until you get a clear conception of what it's all about you can't think clearly about it. You can't make a 100 per cent overhaul of an engine until you get the parts out where you can see them. Figures are the parts of a business.

7—If you have no system in your business which gives you the figures called for in paragraph 3, your business is not on a safe foundation. There is too much play in your business steering gear.

8—If you are not of such a disposition that figures interest you, you are not a complete business man. Real business consists of figuring out how to make the things you do pay a profit.

9—If you don't care to bother with the figures end of the business, it will pay you to hire some one to do it, even if it is only a bank clerk who does it evenings.

10—The first and most important step is set down last. You must WANT to analyze and improve your business and must then DO IT.

Ideas Are Priceless

An idea of an intangible article. It costs nothing. But if put to work it can transform itself into great volumes of cash returns.

The aim of this Department of Better Business is to provide the readers of Motor Age with ideas that can make their profits better.

In return for the ideas that others give to you, give your own good ideas 30,000 chances to go to work by passing them on to the other readers of Motor Age.

For the trouble of writing —One Dollar.

Talk to Him

In the bulletin of the Buffalo Automobile Dealers Association was printed a fine suggestion. It is that the boss take the time to talk to the new men who come into his employ, no matter what their position.

Can't you remember when, at some time in your life, YOU took a new job? It was all new and strange. You knew nobody, you were inefficient on the job because it was new to you, and you welcomed any word of counsel or encouragement, even from the porter.

And don't you remember how you warmed up to the man who condescended to speak a pleasant word to you?

How much would it mean to every new employee if the boss would make it a point during the early days of his employment—and ever after—to say a pleasant word once in a while and give advice when possible.

If you expect the worker to be interested in you and your business you must be interested in him.

Like School Days

There is a dealer in Sioux City, Iowa, who used to operate—and perhaps still operates—a plan for helping his salesmen and other employees become more efficient.

His plan was simply a system of written examinations for everybody in the place. They were required to answer the questions without looking up the answers. They could, of course, look up the answers afterward.

The questions were not trick queries, but were simply those fundamental points which should be known by every one connected with the organization. They included such as:

"What make and model of engine is used in the Blank car?"

"What is the policy of this company regarding free service?"

A continuous operation of this system is one to bring pertinent points to the attention of the employees and to ascertain how rapidly they are progressing.

The Kiddies

Ever hear of the dealer who held a reception for the kids of his town?

He made quite an event of it. He gave over a day to the affair, advertised to all the children in town, gave each one a souvenir, had light refreshments, on which the kids probably were not very light, had his organization act as guides, showed the kids everything a kid wants

to know about engines and all that sort of thing and gave them a general good time.

Result: All the kids in town talked about this dealer and his car, told what a fine fellow he and his people were, what a fine engine the car had, what a fine building the dealer possessed, and how they were all going to have one of these cars when they grew up.

Moral: If you can get every kid in town to boost for you, you can sell the town anything.

The End of the Road

There is a dealer out in Iowa who sells trucks to farmers. Also, he has studied the job and makes his way as easy and economical as possible.

If he can find a prospect out on the road that leads to town he makes his first sale distant from the city. Then, day by day this truck advertises the dealer as it runs by the doors of all the other farmers along the route. The farmers along the route also talk to the owner of the truck.

Result: Prospects are secured from the first buyer and the truck has a pretty fair reputation by the time the dealer gets around to sell other farmers.

Sell Them Now

A plan for making buyers take immediate delivery of cars, trucks and tractors, and which has been used with success by a number of dealers, operates as follows:

On a chart, blackboard or large sheet are set down the dates when cars are due to be received by the dealer.

The man who wants a car three months from now is sold a certain car, due at a certain date, and his name is marked down opposite this car. Sales are made at the far end of the line first, if sales happen to be slow and immediate sales are difficult.

Then, when a man wishes to take a late delivery he is shown the chart and told that cars for future delivery are all taken and that all he can get is one coming in soon or on hand NOW.

Did You Ever—

Did you ever stop to think that what you have done during the past hour is about one-eighth of what your day's work will be?

And that what you intend to do during the next hour will be another eighth?

Figure it out!

That First Truck

It isn't the first truck sold that brings the profit. Selling the first one may eat up all the profit there is in the deal. The big profit in motor trucks comes from repeat orders. Of course, there is money in single sales, but there is MORE money and BETTER BUSINESS in the repeats.

Wherefore, when selling trucks, make your strongest effort on the prospects who may be able to use more than one truck if the first one is satisfactory. If you have a choice this afternoon between working on a one-truck prospect or a ten-truck prospect it is better to land the ten-truck man than the one-truck house.

One good truck will sell another, if the first one is placed where it has a chance.

The Glad Hand

Is every one in your organization so trained—and checked up—that each individual is a pleasant point of contact for the public? If not you are losing money that you might be making.

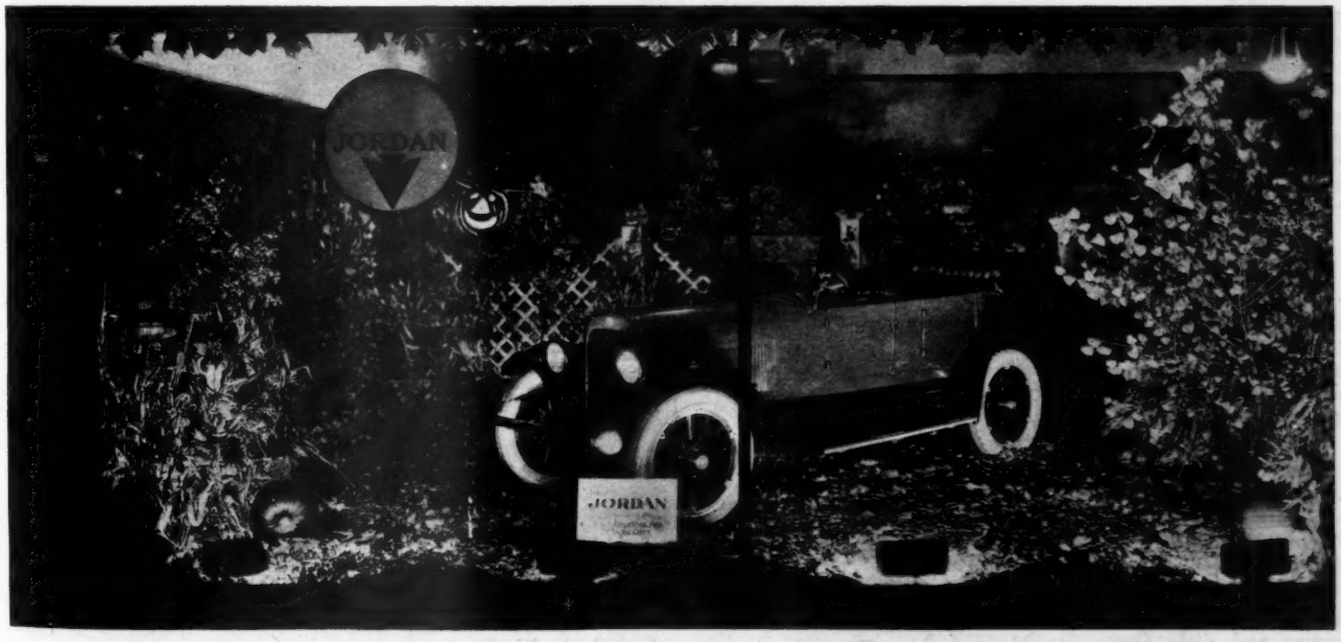
When people telephone you is the voice that answers pleasant? Go outside some day and telephone in and find out.

Is there a pleasant greeting on the salesroom floor? And prompt? Watch the system and find out.

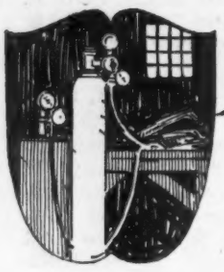
What is the character of greeting to a man who enters the shop? Study it and find out.

How many times have you condemned railroads, telephone companies and other big corporations because of the treatment accorded to you by employees? And how about YOUR OWN business?

The Lure of the Road Will Help Sell the Car



About two squints are all that is necessary to see how to set up this window. You need branches from trees, corn stalks, pumpkins, a lattice fence or partition of some kind for a background, concealed lights in the foreground and a scattering of rustic material. Make a sign that fits your car and stand it as shown. Then—after this has stood a week, set up a new window. This window is by the Miller-Bay Motor Co., of Denver



Autogenous Welding

What it is and how it is applied

THIS is the fifth of a series of articles on autogenous welding and describes the method of using the welding torch. These articles are intended to be of aid to the man who must learn the art of welding with little or no personal instruction. They also are intended as a reference for the man attending a welding school. . It is likely that during the first few months of his instruction many problems will come up that may be solved more readily with these articles on hand.

Finally, this series should be of benefit to any automotive service man or repairman, even though he never intends to have a welding tourch in the shop. The reading of these articles will give him an understanding of the subject which should greatly aid him in general repair work. He will be better able to decide, when he has a part to repair, whether it is feasible or not to weld it, and if so, if it will pay. The more familiar one becomes with this art, the wider the scope of its application. The man who is versed in the art will find many clever applications that one who is less familiar with the subject would never dream of. An understanding of welding principles offers a new technique to the automotive repairman.....

PART V—PREPARING AND USING THE TORCH

BEFORE lighting the torch the proper tip must be selected for it, the tip depending on the work to be done. Every manufacturer of torches furnishes a table for his particular equipment and this should be followed. A table for the low pressure torch manufactured by the Oxweld Acetylene Co. was published last week and is typical.

For instance, suppose it is desired to weld ¼-in. metal. According to the table, a No. 7 Oxweld tip is required and the oxygen pressure should be 16 lbs.

Do not use too small a tip for the thickness of metal to be welded because in such a case the heat will be radiated almost as fast as it is produced and the flame will have to be held at one point so long before the weld can be accomplished that the metal will be burned. It will take much longer to make the weld and a much larger consumption of gas will be required.

TROUBLES FROM LARGE FLAME

Too large a flame is equally bad because the operator will not be able to correctly place the mass of molten metal fused. The proper flame will reduce the metal to a molten condition and of a width about equal to the thickness of the metal.

Instructions for the handling of a medium pressure torch vary slightly from those for a low pressure torch and the complete list of steps as advised by the Davis-Bournonville Co. are presented for the guidance of the reader.

1—See that the oxygen regulator and tank valve connections are free from oil, grease and dirt. Open up the oxygen tank valve slowly so that oxygen will just issue, then close it again. This is to insure the easy opening of the valve after the regulator is attached; a quick opening would damage it.

2—Connect the regulator to the tank or service pipe, noting carefully the instructions on the tag attached to the regulator. See that both regulator adjusting screws are turned back unil the spring pressure is no longer felt, and also that both needle valves on the torch are closed.

3—Open the oxygen tank valve very slowly and continue to unscrew it until it cannot be turned any further. Full opening prevents leakage around the valve spindle. If a new tank is used the tank pressure gage will record 1800 lbs., the exact amount varying slightly according to the temperature.

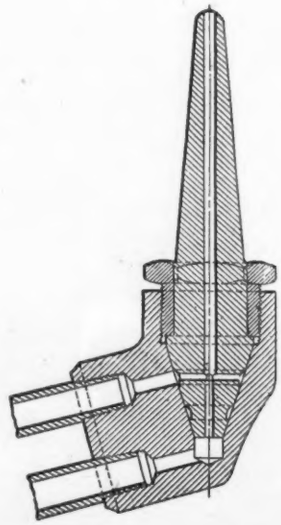


Fig. 12—A section through the head of a medium pressure torch. Oxygen and acetylene enter the head through separate pipes and are thoroughly mixed in the long central passageway leading to the tip

4—Open the oxygen needle valve on the torch.

5—Turn in the oxygen regulator adjusting screw. The torch pressure gage will then indicate working pressure. Adjust this to two pounds more than that called for by the table for the tip being used. The two pounds extra pressure will allow for adjustment for drop caused by lowering pressure in tank, variations in gages, etc.

6—Shut off oxygen needle valve on torch.

7—Turn on acetylene needle valve on torch.

8—Turn on acetylene at source of supply—pipe line or tank.

9—Turn in the acetylene regulator adjusting screw until the pressure given by the table for the size of tip being used is recorded.

10—Light the gas issuing from the tip. This will give a long, white, smoky flame of comparatively low temperature.

11—Slowly open the oxygen needle valve on the torch. The size of the flame will gradually grow smaller, the envelope becoming less luminous and the cone increases in distinctness until the luminous portion at the tip assumes a clear outline without any ragged edges.

12—When this is obtained again turn off the oxygen slightly until a shadowy point shows from the cone. Then with extreme care turn on the oxygen until this shadowy point just disappears into the cone. This, with the type of mixing device used in this torch, gives the correct flame with a temperature of 6300 deg. and no tendency to oxidize or carbonize.

FLAME OUTLINE CLEAR

The freedom of a flame from being carbonizing or oxidizing is not neces-

Fig. 13—When the blow torch becomes clogged it may be cleaned out with oxygen by slipping the end of the oxygen hose over the top of the blow pipe

sarily indicated by the clear outline of the cone which merely shows that all the particles of oxygen and carbon coming together are burned.

13—The correctness of the adjustment by the method just indicated should be made from time to time so as to be sure that no change has taken place caused by a drop in gas pressures. A slight excess of oxygen will not readily show in the flame and can only be discovered by this test.

If the blowpipe is handled properly it should not require a great deal of attention; occasionally it will require cleaning. The tips should never be cleaned with anything but a soft copper or brass wire. If something harder is used the hole will gradually become larger and the head will not work so well.

Often dirt can be blown out of the head by means of oxygen at high pressure.

If the flame is improperly adjusted or the tip becomes clogged the blowpipe may backfire. If the backfire continues close both the acetylene and oxygen valves and relight the blowpipe.

If the blowpipe becomes overheated it may be cooled by plunging into water. When this is done be sure that the acetylene has been shut off and that a small quantity of oxygen is passing through.

The blowpipe may be cleaned by removing both the acetylene and the oxygen hose and then connecting the tip of the head to the oxygen hose, Fig. 13, turning on about 20 lbs. pressure. The acetylene valve must be opened and the oxygen valve closed. This will drive any dirt or carbon through the larger acetylene passages. After this is done the acetylene valve should be closed and the oxygen valve opened to clean out the oxygen passages.

Flash-backs or back-firing in the torch are of more or less frequent occurrence, depending on the type of torch used and upon local conditions. With some types of welding torch this condition is due to the design of the torch itself and the principles under which it operates. A good torch, however, should be so designed that back-firing or burning of the gas back of the torch tip seldom occurs except as it is due to local conditions and careless operation.

CAUSE OF BACKFIRING

The cause of back-firing may be insufficient flow of gas from the outlet of the tip. If the flow is sufficient the gas will burn outside of the tip. If the pressure of the acetylene is too low, if the hole in the tip is obstructed by dirt, particles of molten metal, allowing the tip to rest against the work or to drip into the molten metal while welding, or if the tip is excessively overheated the flame will pass back into the tip.

In nearly all cases it is due to the operator not having sufficient acetylene pressure turned on at the regulator. The remedy is obvious—use the proper pressure recommended by the manufacturer for that size of tip.

When a back-fire occurs, immediately turn off the oxygen with the torch valve and the gas will relight outside the tip. If it does not relight turn off the acetylene, examine the tip, clean it if necessary and then relight.

Back-firing fouls the interior and roughens the surface. Continued back-firing may cause a carbon deposit to form on the interior.

WHAT HAS GONE BEFORE IN THIS SERIES

In the four preceding articles we have taken up the subject of weldin gin general, together with a discussion of the outfits, regulators, generators, and methods of connecting up the equipment. The first three or four articles of this series necessarily dealt with the fundamentals of welding, taking in this case the oxygen-acetplene method.

In this connection it might be well to state that autogeneous welding is a term often misapplied, in that it is taken to mean the fusion of metals by the oxygen-acetylene flame only. Autogeneous welding also can be done by electrical means, generally termed electrical welding. More of this will be said at the termination of this series, which is confined to the oxygen-acetylene method. In this week's issue we take up the preparation and use of the torch, which is the business end of the welding outfit.

NEXT WEEK

The chemistry of the oxygen-acetylene flame will be discussed. While the welder need not be a scientist to do a good job of welding, he ought to know certain facts concerning the chemical and physical properties of the flame and materials with which he is working.

Standard Mechanical Operations in Tractor Service

by John Charles Thorpe, M.E.
and Gustav Howard Radebaugh

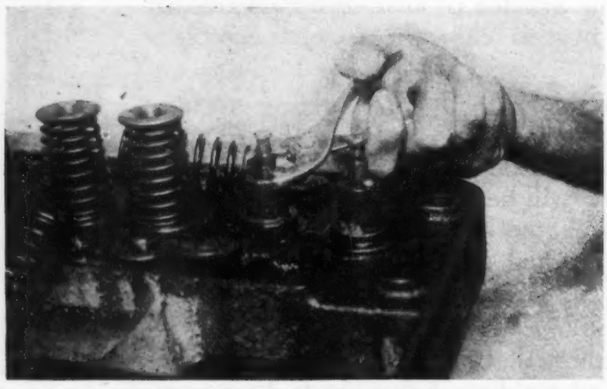
THE article herewith, while part of the series on Standard Mechanical Operations in Tractor Service, is, nevertheless, applicable to the entire field of automotive service work. Valve mechanism basically is not very much different in a tractor than motor car or truck engine, consequently what is said here applies in a large measure to any vertical cylinder internal combustion engine.

The valve mechanism of an engine is one of the prolific sources of trouble and nothing will throw an engine out of efficient running more quickly than improper functioning valves. Automotive dealers and repairmen will do well, therefore, to read and study carefully the article herewith and those that are to follow, so that mechanics might get the benefit of properly making valve repairs and adjustments.

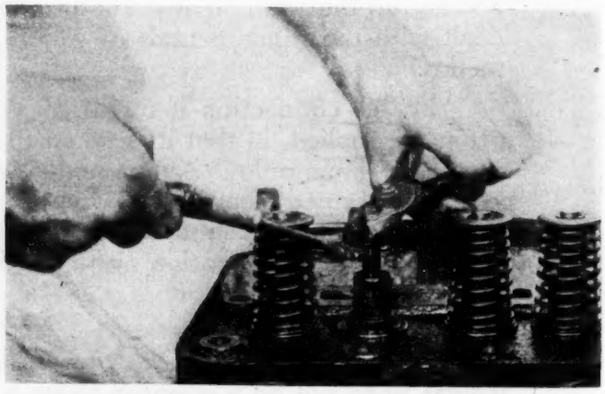
In studying this series of articles it is well to bear in mind that the authors have given much study to the question of motion and time. In other words, the operations have been worked out so that minimum effort and time is required to do the work. Often much time is wasted by mechanics doing unnecessary work on a job, which job if intelligently handled could be done in half the time.

Trouble—Motor fires irregularly and does not develop power

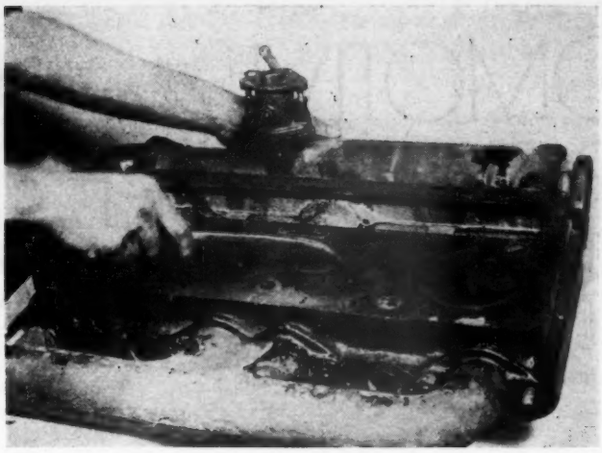
Cause—Carbonized and pitted valves and seats leaking compression



1. Clean and grind valves and seat. Procedure: (a) Remove valve springs as previously described, being careful to see that retainers, split washers, and springs are given proper care

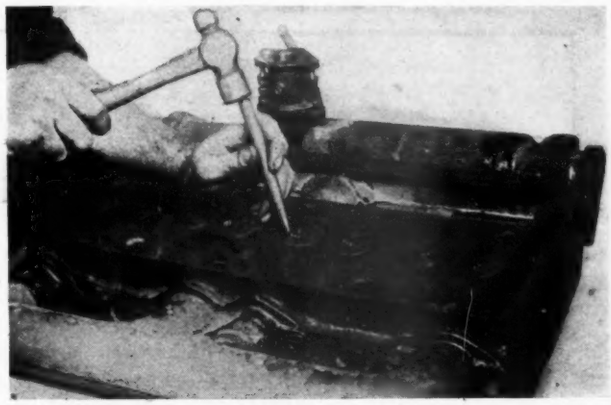


2. After springs are removed, put in or cotter through hole in valve stem to keep valves from falling out while handling firing head in future operations, and when replacing head on cylinder block

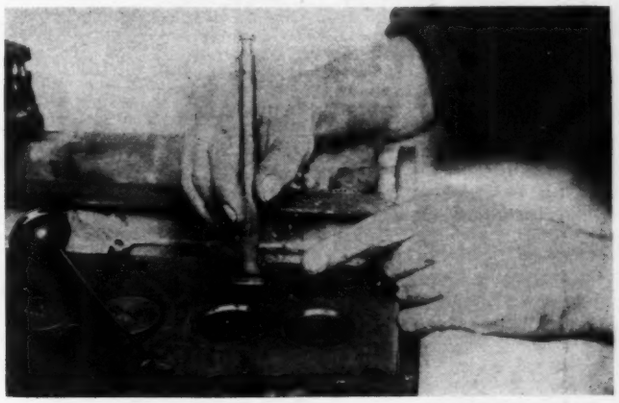


3. Turn firing head over and clean the carbon from valves and firing head. A proper tool, called a "scraper" may be made from an old file, heated and bent as indicated in the view and ground to a sharp point

4. After firing head is thoroughly cleaned, wash off the surface thoroughly with gasoline, to r emove all loose particles of carbon. This will prepare the exposed surfaces for further procedure



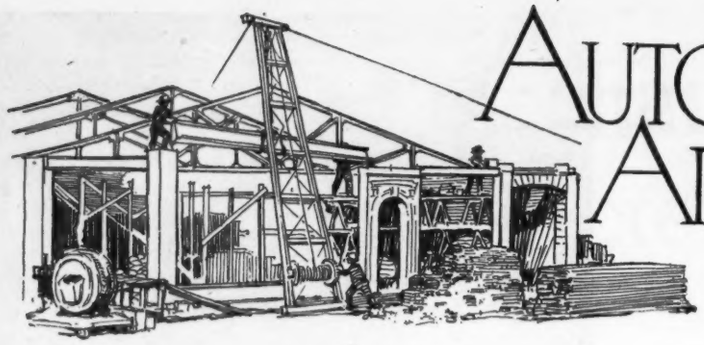
5. Using a light hammer and sharp center punch, mark all the valves in regular order, one point for number one, two points for number two, etc. The view shows the operator marking the fourth valve



6. The compression test indicated a leak through the valves in cylinder number one. Number one valve is removed and is found not to be bearing on the seat at the point indicated in this view

7. This view shows the cans of grinding compound. This can be purchased in almost any garage or supply store. Both coarse and fine grade should be secured, the coarse for the first operation where the valve and seat are in bad shape, and the fine for the final grinding. The view also shows the operator covering the valve with the compound preparatory to grinding

8. Place auxiliary spring on valve stem to provide slight r esistance to grinding pressure. Its usefulness will appear as operation proceeds. Such a spring may be found in most any farm shop



AUTOMOTIVE ARCHITECTURE

Planning and Building Problems

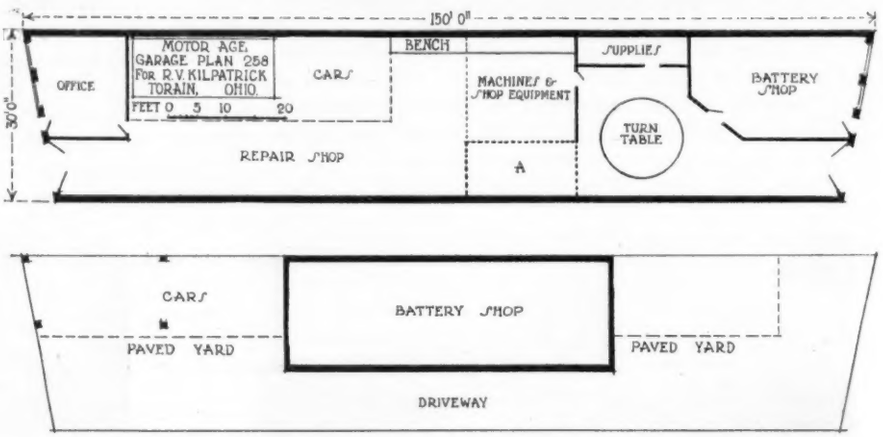
CONDUCTED BY TOM WILDER

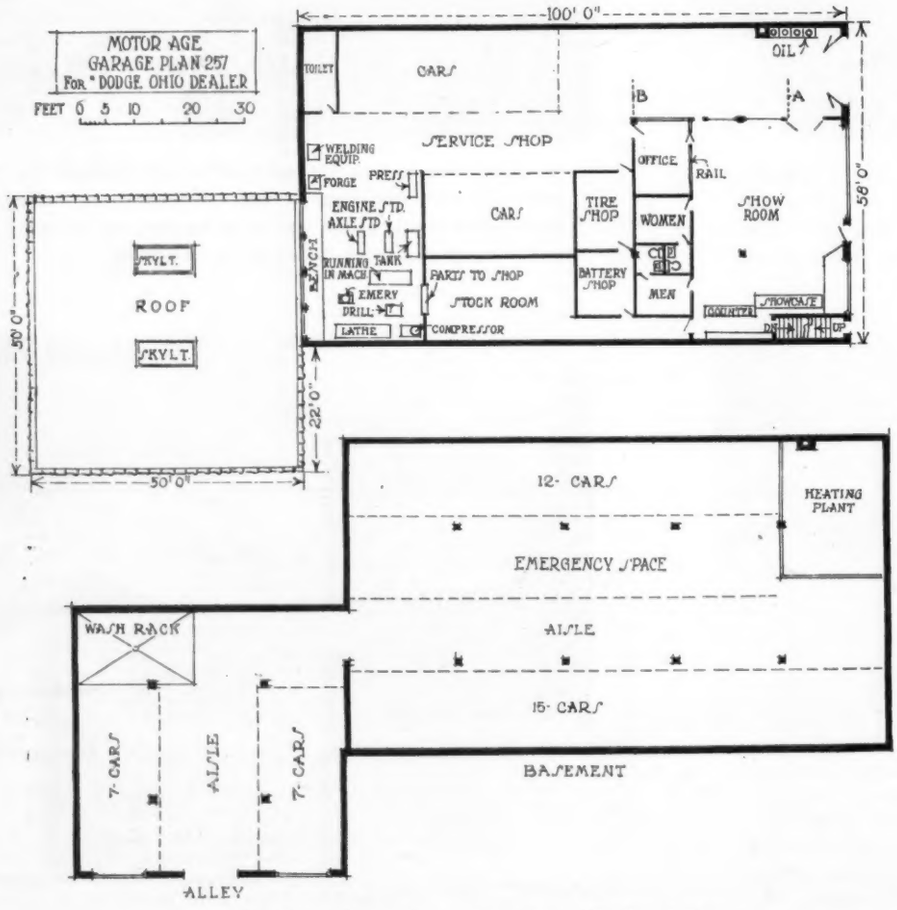
No. 257

DODGE SERVICE STATION

From the rough sketch of lot enclosed will you publish a plan for a garage suitable for the lot. In the basement want a garage for wash racks and storage only. On the ground floor, at street level opening, want a salesroom for four Dodge cars, accessory and parts room for $8000 stock opening into the salesroom and rear to shop. Accessible to the salesroom, if possible, a battery and tire repair department adjacent to the service shop. Office inside of rail at back of showroom with women' sroom and a men's room opening into it; service employee's toilet off shop. Shop equipment to consist of lathe, drill press, emery, compressor, engine and axle stands. Above the showroom is to be an apartment for use of owner or one of the chief employees.—Dodge Ohio Dealer.

Your plan fulfills about all the conditions you impose upon us, and on the whole is a pretty fair layout. The storage space for cars in the shop is more limited than we would like; however, there is room for nine and that is probably as many as would be worked on at once. The overflow could be kept in the basement garage.





A sales and service station for a Dodge dealer

Here is a good example of a building on a narrow lot. A width of 30 ft. is not very much and a turn table is there for a necessity

The difference in level of 10 ft. is hardly enough for a good basement. It will only leave 8 ft. in the clear below beams at best, and from this must be taken 8 or 10 in. in some places for heating pipes, etc. An incline might be resorted to extending from A to B, with a raise of 2 ft., which would hardly be noticeable; or, the basement might be depressed slightly, including the whole floor of the 50 by 50 ft. rear part from the alley side down to the center of the wash rack.

We have not attempted to plan the apartment, but show the front four posters extended up to support this structure and an outside stairway to give access to it. This space, 39 by 58 ft., probably is more than is needed for the apartment so it might be advisable to use part for your stock room thereby giving more space for service.

No. 258

THE NARROW LOT PROBLEM

I have a lot 30 by 150 ft. centrally located between two main streets, which I think would make an excellent storage battery service station. The diagram will give an idea of the location. Outline how

you consider such a service station should be laid out. Would a two-story building be the proper thing, and would it be practical to have a general repair shop in this size building?—R. V. Kilpatrick, Lorain, O.

Your lot hardly is wide enough to make a good location for a repair shop. The frontage on two streets is a very valuable feature, but one reason for its value would be the ability to drive through from one street to the other. In a space so narrow, this passage takes a third to a half of the available space and leaves little for work or the storage of cars.

Our idea of an ideal battery service station on this lot is shown in the lower of the two diagrams. The building itself would occupy the center, 50 or 60 ft., with a 10 ft. passage leading past. A paved yard or court at either street entrance would give space to park cars while making battery changes, or they might be left while batteries were being overhauled if you furnish rapid service.

Some sort of portico or pergola effect might be used to serve the dual purpose of protection to the cars and improve the appearance of the yard.

This space would make a fine filling-station site, or would be a good location for a washing plant or "automobile laundry" as they are sometimes called.

MOTOR AGE is receiving many inquiries for garage plans which do not give sufficient information to permit an intelligent reply. There are certain things which should be known to lay out the proper plan for a garage, and readers are urged in asking for such plans to be used to include the following information:

Rough pencil sketch showing size and shape of plot and its relation to streets and alleys.

What departments are to be operated and how large it is expected they will be.

Number of cars on the sales floor.

Number of cars it is expected to garage.

Number of men employed in repair shop.

And how much of an accessory department is anticipated.

No. 259

BUILDING WITHOUT AN INCLOSED SHOWROOM

—Publish plan for a three story service station which is to be erected on a 150 by 60 ft. corner lot. The accessory department will be on the first floor. The elevator will be placed in the center of the building in the rear. There will not be a regular showroom but plate glass windows placed in a corner of the building fronting on two streets. This will be used to display new cars and will not be cut off from the main building.

The second floor will be used for the repair shop with an office in the front part of the building. It will also be fitted up with shower baths, lockers, etc., for the mechanics. The shop will employ at least twenty men. The stockroom will be on this floor also and will be connected with the accessory department by means of a dumb waiter. The third floor will be used for storage only.—P. B. Comer, Greensboro, N. C.

The main objection and only one of importance that we have to your layout, is the location of the elevator. Admitting that it is very convenient to run down the aisle and straight onto the elevator, we can't help calling your attention to the fact that by choosing this location for the elevator you make pockets of the spaces on each side. If you can utilize these spaces for special shops such as battery, tire, etc., this arrangement would be satisfactory, but we are of the opinion that you desire all storage space possible on the first and third floors. You will note that when a car is at position B, cars cannot enter or exit from position C. The same condition prevails at F and the corresponding positions on the second floor.

If your elevator is at same position along the side street as at B, cars could enter from outside the building as well as from within. If for any reason you object to the side entrance, the position A is a first class one and will only eliminate two car spaces as against from four to six the other way. As you will notice, the pockets cannot be used as wash rack locations for the same reason they are not good for storage.

We quite agree with your non-inclosed showroom idea. We have suggested it several times where there was limited frontage but without much success. You really do not need to resort to it, however, if your side street is in good condition for you could make your car entrance on the side and cut off a strip across the entire front for your show room. An inclosed showroom adds dignity to your place that you cannot get in any other way.

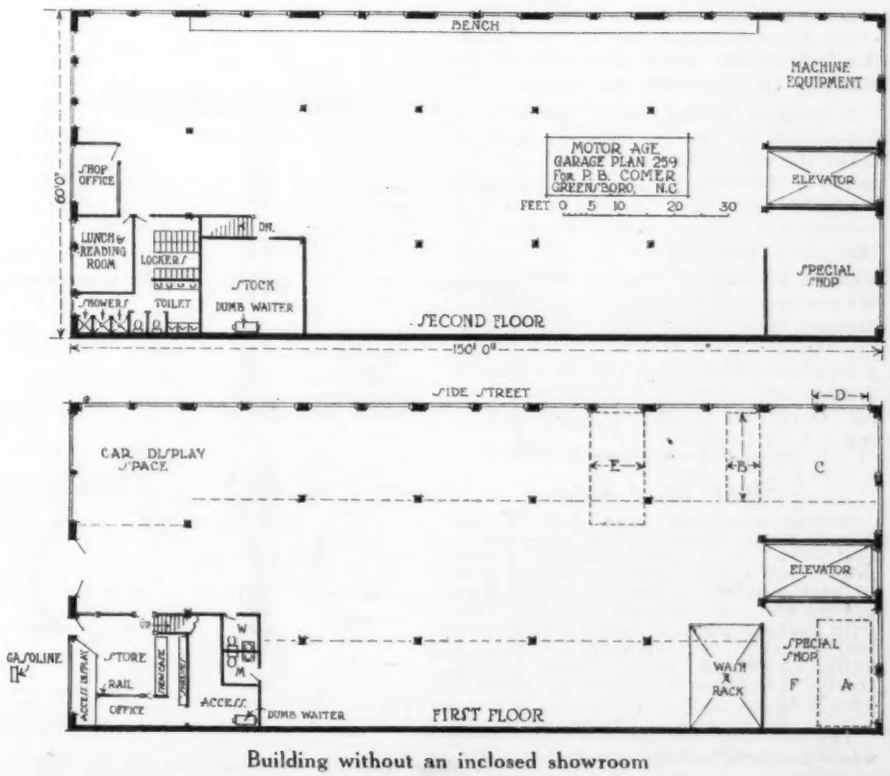
New Price Schedule for Packard Trucks Announced

Detroit, August 13—New Packard truck prices, which will become effective with the elimination of one or two sizes within the next 30 days, are announced as follows: Solid tires, size E. C., standard chassis $3,850, F. O. B. Detroit. Size E. C., long wheel base, $3,925. Size E. D., standard chassis, $4,900. Size E. D., long wheel base, $4,975. Size E. F., standard chassis, $5,950. Size E. F., long wheel base, $6,025.

Pneumatic tires, size E. X., standard chassis, $4,650. Size E. X., long wheel base, $4,725. Size E. Y. ,standard chassis, $6,050. Size E. Y., long wheel base, $6,125.

The old schedule called for completion of the year's allotment about August 1, but many delays were encountered in production and it will be about September 1 before the schedule is complete.

There will be no change in the models, the new schedule simply eliminating some of them. Dealers with trucks on hand or unshipped will not be effected by the new price schedule as regards the old trucks.



Building without an inclosed showroom

The Readers' Clearing House

Questions and Answers

CONDUCTED BY ROY. E. BERG

Technical Editor Motor Age

THIS department is conducted to assist Dealers, Service Stations, Garagemen and their Mechanics in the solution of their repair and service problems.

In addressing this department readers are requested to give the firm name and address. Also state whether a permanent file of MOTOR AGE is kept, for many times inquiries of an identical nature have been asked by some one else and these are answered by reference to previous issues. MOTOR AGE reserves the right to answer the query by personal letter or through these columns.

STEERING GEAR TROUBLE

Q—A 1917 Buick 4 will steer only to the left. Instruct how to correct this.
2—An Overland 90 T will only shift to reverse. New countershaft roller bearings were installed. Instruct how to repair.—F. A. Poche & Son, St. Amelia, La.

1—This is probably caused by the shearing of one of the lugs, or pins, pinned to the half nut. Refer to Fig. 1. There are two lugs which are indicated in the illustration which are directly above the steering yoke roller and which work in conjunction with this roller. In order to remedy this condition it will be necessary to take the steering mechanism apart to replace the lug.

Disconnect the spark lever and throttle controls, also the steering pitman arm. Next disconnect the horn button connections and take out the bolts in the plate on the dash which holds the steering tube. It will then be necessary to remove the bolts from the steering gear housing so that the entire assembly may be removed from the car. You can then get to the lugs, which are attached to the half nuts by removing the necessary bolts and opening up the housing.

This whole job is rather inaccessible and will probably take at least twelve hours if you have never taken this assembly apart before. Because we have no diagram which we can refer to for every detail necessary, we cannot outline every move to make, but if you follow the instructions given there will be no difficulty in remedying the trouble.

2—Because of the lack of details it is impossible for us to tell you how to make the repair or to even tell you the cause of the trouble. Perhaps the countershafts are out of line or the shifter fork is bent. There is also a possibility that some part has let go and become wedged so that you cannot shift gears. We are inclined to believe since you have installed new countershaft bearing that the shafts are out of line. When taking a transmission down as you have done to replace the bearings it is always advisable to run the transmission before placing it back in the car.

NOISY REAR AXLE

Q—The rear axle in a 1920 Willys-Knight Sedan is noisy. The noise was a sort of a growl. The ring and pinion gears have been replaced but did not seem to help matters. Then the gears were ground and now the axle is fairly quiet with the exception of when accelerating the car and when slowing up there is quite a singing noise. What is the trouble?—Herman Kokemueller, Milwaukee, Wis.

The fact that you get a singing noise when accelerating and also when coasting leads us to believe that there is too much backlash in the gears. The backlash or clearance of the gears should be about .006 to .008 in. and the teeth of the pinion and gear should be flush with each other at the large ends. The point at which the most silent operation is obtained is best determined by experimental adjustment.

One good method of determining whether the adjustment of the gears is too tight or too loose is to take a piece of wrapping paper, which is about the correct thickness, and run it through the gears. If the print of the gear teeth have been cut through it is quite certain that the setting is too tight. If the print does not show up distinctly it is an indication that the adjustment is too loose.

The only suggestion that we can make is that you examine the gears and bearings carefully, line them up and make an adjustment.

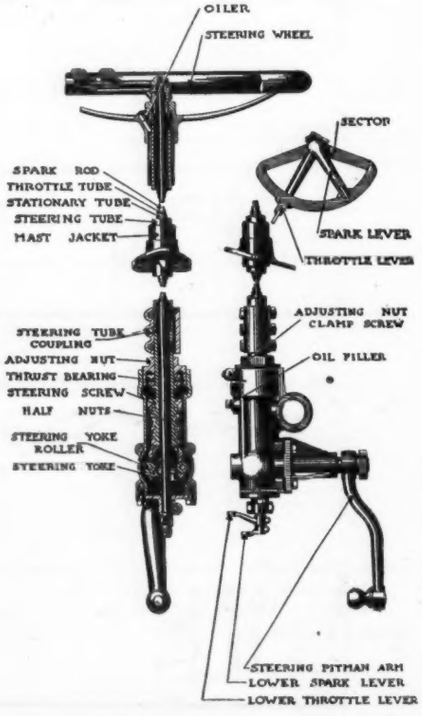


Fig. 1—Sectional view of the Buick steering gear

AUBURN REAR AXLE ADJUSTMENT

Q—Instruct how to remove the play from the ring and pinion gear on a 1918 Auburn Six.—C. R. Algyer, Seattle, Wash.

We have no diagram of the axle used on the 1918 Auburn car but we can give instructions, using an axle of similar construction which will be applicable in your case.

According to the information in our files there were two types of axles used, one a three-quarter floating and the other a full floating axle. For our example we will take the three-quarter floating axle. Refer to Fig. 8.

To shift the position of the pinion to adjust its mesh with the large drive gear pinion, cage A may be turned forward or backward. First loosen clamp bolt C and remove lock cap B. Then turn the cage to right or left with a screw-driver. When correct adjustment is obtained replace lock cap B and tighten the clamp bolt C. To take up the wear on the piston shaft bearings, straighten lock washer F and remove the lock nut E. Then tighten the nut D until play is taken up. After adjustment is made tighten lock nut E and bend the lock washer F so as to keep same from turning. The large bevel gear may be moved by turning the thrust bearing caps G after first removing the lock clamps H. However, a good way to test the setting is to have an ordinary piece of wrapping paper and place it between the gears. Revolve the gears and see what the effect is on the paper. If it shows signs of being too heavily pressed or the paper is cut, the setting is too tight. If no impression is made it is a sign that the adjustment is too loose. If the adjustment is properly made it will show a clearance of from .006 to .008 in.

SPEEDOMETER DRIVES

Q—How are Stewart speedometers geared when they are driven from the propeller shaft? Illustrate the construction of the driving mechanism from propeller shaft to speedometer.

2—On account of cord tires being larger, what change must be made to make the speedometer register correctly. The tires were changed from 32 by 4 in. fabric tires to 32 by 4 cord tires. In this case the

speedometer is driven from the front wheel. What changes would be necessary when changing from fabric tires to cord tires of any other size?

3—What changes must be made when the speedometer is driven from the propeller shaft? Or is the difference in size so slight that no change is necessary?

4—Do motor car manufacturers have some plan or rule by which they figure the tire size needed for their car? If so, what is that rule?

5—If it is better to use oversized tires, why are not the cars so equipped?—Alvin Steinberg, Tilledo, Wis.

1—At the present time manufacturers are using a set of gears inside of the transmission case to drive the speedometer shaft. Fig. 2 shows the installation on the Buick car. The drive is taken from a spiral gear which is attached to the main shaft of the transmission, through a series of reduction gears which are inclosed in a housing which is fastened to the transmission end plate by means of two set screws. The cable or drive shaft is enclosed in a flexible tube which is attached with a knurled nut at either end.

2—A change to cord tires makes a difference that is so slight that it is not necessary to make any changes in the speedometer gear ratio.

3—No changes are necessary.

4—There is no absolute rule that can be applied. The principal factors entering into the determination are gear ratio and car weight. In making a choice it is necessary to consider the entire chassis design.

5—Some cars are equipped with oversize tires. We cannot tell why this is not done but it is evident that the car manufacturers consider the size of the tires they have chosen adequate and able to fill the bill.

PAIGE REAR AXLE ADJUSTMENTS

Q—When going about 30 to 35 m.p.h. with my Paige 6-42 there is a roar that seems to come from the flywheel and gears. What causes this?

2—Upon opening the throttle quickly there seems to be a knock as if the spark were advanced too far, but it acts the same when the spark is retarded.

3—There seems to be a tapping noise in the engine like tapping on a solid piece of iron. Would loose valve tappets cause this?

4—What mileage should this car do on gasoline and what speed is it capable of?

5—What speed and how many miles per gallon with the 1919 Mitchell E-40 make?

6—What speed and how many miles per gallon with the Nash make?—M. L. Johnson, Hibbing, Minn.

1—Your statement with regard to the roar is certainly very indefinite and consequently the only thing we can do is give the possible causes of the trouble. It is not logical to believe that the flywheel is loose but it is probable that the ring gear and pinion is set up too tight and causing the hum. It is also possible that the noise is coming from the timing gears but it would hardly be a roar. The purpose of adjusting the rear axle is to properly align the bevel drive pinion and ring gear. The pinion shaft assembly complete is attached to the adjustable sleeve as shown in Fig. 5 and by turning the sleeve the pinion can be moved inward or outward, as found necessary, to bring the ends of the teeth

TO assist readers in obtaining as a unit all information on a certain subject, MOTOR AGE segregates inquiries in this department into divisions of allied nature. Questions pertaining to engines are answered under that head and so on.

F. A. Poche & Son.....St. Aemlia, Pa.
Herman Kokemueller.....Milwaukee, Wis.
C. R. Algyer.....Seattle, Wash.
Alvin Steinberg.....Tilledo, Wis.
M. O. Johnson.....Hibbing, Minn.

MISCELLANEOUS

Roy A. Fuhrer, Main Street Garage and Tire Co.....Cherryvale, Kans.
Frank D. Randall.....Dodge City, Kans.
L. H. Raines.....Kansas City, Mo.
John Dunlap.....Muskogee, Okla.
Ned Bentley Garage.....West Summerland, B. C.

ENGINES

O. V. Knauser.....S. Des Moines, Iowa
C. W. Canady.....San Antonio, Tex.
Louis Balker.....Central Valley, N. Y.
W. J. White.....Oakley, Miss.
Electric Light and Power Co.....Fulton, S. Dak.
W. L. Skeis.....Centerville, Ark.
Wm. Lewis.....Lehigh, Mont.
John H. Biggs.....Queen City, Mo.
W. B. Young, Young's Garage.....Florence, Ariz.
Walter S. Crays, Central Garage.....Checotah, Okla.

THE ELECTRIC SYSTEM

A. D. Sligh.....Durham, N. C.
James B. Collins.....Aberdeen, S. Dak.
Jos. R. Tate.....Harrisburg, Ill.

CARBURETION

C. E. Pries.....Chanute, Kans.
Philip J. Kenny.....New York City
Kokomo Tire Sales Co.....Jacksonville, Fla.

flush with the inner ends of the teeth of the ring gear. The movement of the adjustable sleeve one notch is equivalent to a movement of approximately .004 in. at the pinion. The proper adjustment of the bevel ring gear (attached to the differential housing) in relation to the drive pinion, for the purpose of securing quietness of action, can only be accurately arrived at by experimental settings within the limits of five to ten thousandths of an inch back lash, and here also the movement of the adjusting nuts, one notch is equivalent to a movement of approximately .004 in. at the bevel ring gear. To adjust the bevel pinion the drive shaft rear universal joint must, of course, be disconnected from the flange on pinion shaft and the adjustable sleeve lock removed. The

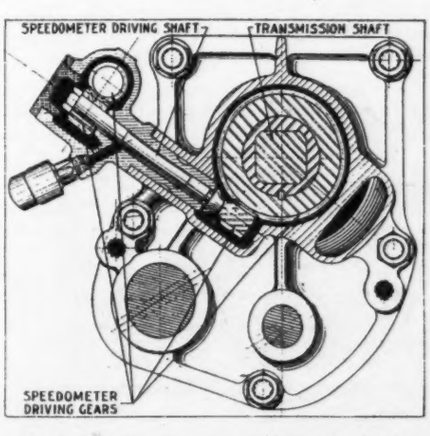


Fig. 2—Illustrating speedometer driving shaft and gears

differential adjusting nuts (which are threaded into the differential support and act directly upon the roller bearing outer races) are accessible when the rear cover plate has been removed as shown in Fig. 3. To increase the amount of back lash the adjusting nuts B should be removed and one of the cap screws C in each bearing cap loosened. The adjusting nut A on left side may then be turned to the left or anti-clockwise, the required number of notches and the right side adjusting nut turned an equal distance to the right. To decrease the amount of back lash the operation will obviously be the reverse. It is important that all end thrust be removed from the pinion shaft, and as the assembly is held together by the bevel pinion at one end of the shaft, and the universal joint flange at the other, it must be seen that the latter is properly tightened on the shaft by means of the lock nut, in the event that it has been removed. There must, however, be sufficient freedom of the bearing inner races as they are not intended to be locked in position.

2—This is probably due to the carbureter setting and it will require very careful adjustment to overcome this trouble. If the carbureter is set very lean it may operate very well at high speeds but will fail to give good acceleration or operate without a knock at low speeds. This is due to the fact that when the throttle is opened suddenly the inrush of air is so great in proportion to the amount of gasoline that is available with this kind of a setting that it will cause a knock and perhaps spit back through the carbureter.

3—This noise can very likely be attributed to poor adjustment of the valve tappets. After a new engine has been run for some time, and the valve seats have been hammered down, the tappets should be adjusted to about .004 in. when the engine is cold. After the engine has become warm this setting will give the proper running clearance, which is measured between the bottom of valve stem and top of tappet adjusting screw when the valve is closed. It would be advisable, however, to make a careful examination of the engine and parts to see if this tapping is not caused by something such as the fan striking the radiator, some part of the hood rattling, a loose pump shaft or perhaps some part of the body rattling due to vibration.

4—It is impossible to give any exact statement because the mileage obtained is dependent upon the carbureter setting. However, this model ought to get about 15 miles per gallon under average conditions. As far as speed is concerned it is also very indefinite but it ought to attain a speed of about 55 miles per hour.

5—We believe that the statements with regard to the Paige car mentioned in question 4 are applicable to this car as well.

6—It is claimed that the Nash will make about 65 miles per hour under average running conditions and the gasoline consumption is about 15 to 18 miles per gallon.

Miscellaneous

SPEEDING UP BUICK

Q—Instruct how to speed up a Buick H 45. The best we have been able to get out of it was 55 m.p.h. Would you suggest using a smaller ring or a larger pinion gear?—Roy A. Fuhrer, Main Street Garage and Tire Co., Cherryvale, Kans.

We do not advise any changes if you do not intend to use the car for racing purposes. The writer drove one of the model cars mentioned and the best speed that could be obtained was about 55 miles per hour. If you change the gear ratio you will have to do so with a sacrifice of power and acceleration. If you install

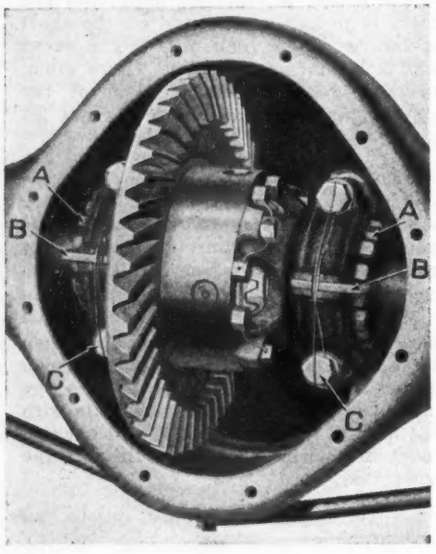


Fig. 3—Paige-Detroit universal joint showing the differential adjusting nuts

larger valves, lighter piston and connecting rods, increase the size of the carbureter, advance the valve timing one tooth and change the gear ratio to about 3 to 1, you can probably get about 80 miles per hour. We believe that if lighter pistons and connecting rods are installed and a 1½ in. carbureter used that you can probably get the car speed up to from 60 to 65 miles per hour.

REBUILDING STUDEBAKER

Q—What speed could be obtained with a 1913 Studebaker six with a 3.25 gear ratio and 35 by 4½ in. wheels, under favorable conditions? Is this gear too high? There is plenty of power.

2—What changes would be practical to make on this car?

3—What is the speed and gasoline mileage of the new Winton 25?—Frank O. Randall, Dodge City, Kans.

1—It is a hard matter to say just what speed could be obtained but we believe that under average conditions 60 to 65 miles per hour is a fair figure. The standard gear ratio used in this model was 4.58 to 1 and unless you intend to use the car for racing purposes we do not advise making the change. A change of gear ratio always makes a difference in the tractive effort delivered and we do not believe that this change without any change in car weight will give satisfactory operation under all conditions.

2—The changes which ought to be made are entirely dependent upon what the car is to be used for and under what condition it will have to travel.

3—We have no information regarding the gasoline consumption of the Winton Six but under average conditions the car should make about 65 miles per hour.

CADILLAC OILING SYSTEM

Q—Publish oiling chart of the 1916 Cadillac 53.—L. H. Raines, Kansas City, Mo.

Oiling chart of the 1916 Cadillac is shown in Fig. 4.

NUMBER OF CAR MODELS

Q—Approximately how many different models of passenger cars are made and used in the United States?—John Dunlap, Muskogee, Okla.

From figures taken at the beginning of 1920 we find that there were 14 chassis models and 551 car models; the latter referring to the body designs.

DISTILLED WATER

Q—Would the distilled water, distilled in a still made as follows be free from any metals so that the water could be used in storage batteries or would it pick up a percentage of metal from the metal container, or should the water be handled entirely in glass or china vessels? The still is made as follows: The apparatus stands on a stove and the steam rises through the center opening till it hits the inverted cone of the top cold water section where it condenses and the water drips back to the center section which collects the distilled water and it is drawn off at the tap.—Ned Bentley Garage, West Summerland, B. C.

This device ought to work very satisfactorily and if the interior is heavily tinned there is no danger of any of the metals getting into the water. Fig. 6 shows a sectional view of the still which is described in the above question. The apparatus is made of copper, nickel plated outside and tinned inside.

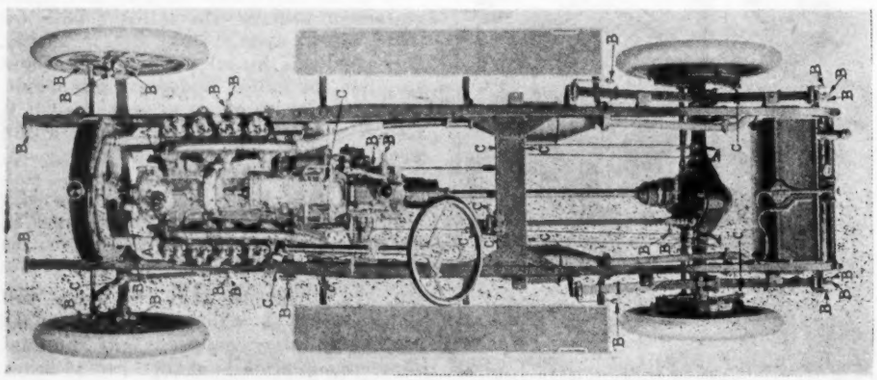


Fig. 4—Oiling chart of the 1916 Cadillic 53

Engines

BROKEN CRANKSHAFT

Q—Have been told that the broken crankshaft in the main bearing of a Rutenber engine cannot be welded. If this cannot be welded where can another shaft be secured?—O. V. Knause, S. Des Moines, Iowa.

Crankshafts have been welded successfully but it is a job that requires considerable skill. However, in a case of this kind, we advise buying a new crankshaft from the Rutenber Motor Co., Marion, Ind. In writing to the company be sure and give them the full details including the serial number of the engine if possible.

CASE VALVE TIMING

Q—Instruct how to time a 1913 Case 40 model.—C. W. Canady, San Antonio, Tex.

The valve timing on the 1913 Case is as follows: The intake opens 13 deg. after upper dead center and closes 30 deg. after lower dead center. The exhaust opens 50 deg. before bottom dead center and closes 13 deg. after top dead center.

THREE PHASE MOTOR

Q—Desire to make a 60 cycle 220 volt General Electric induction motor a single phase as that is the current supplied as I desire to use the motor for small work

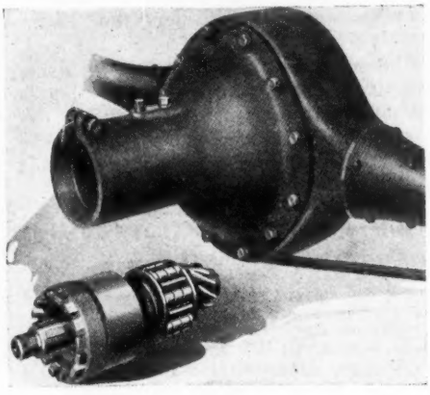


Fig. 5—Pinion shaft assembly of the Paige-Detroit

around the garage.—Louis Balker, Central Valley, New York.

This motor can be operated as a single phase motor but its operation will be inefficient and, in all probabilities, very unsatisfactory for your class of work. We are assuming that the current supplied to you is single phase 110 volts. Since the motor you now have is wound for 220 volts we do not see how you can hope to use it without a change in the windings and this will mean considerable expense. We advise purchasing a new motor that will be suitable to your work.

CASTOR OIL

Q—Desire to use castor oil as a lubricant in a Continental 6-44 engine which has been used three years. Will the regular oiling system on car take this weight of oil or should lighter oil be mixed with the castor oil, or should all the lighter oil be drained out?—W. J. White, Oakley, Miss.

Castor oil can be used and the present system will handle it satisfactorily.

Castor oil is a vegetable oil and must not be mixed with a mineral oil. All of the oil that is now in your crankcase should be drained off and the crankcase cleaned after which the castor oil may be used. When it is necessary to add oil do not put any mineral oil in the crankcase with it.

EXCESS OF CARBON

Q—An International 3 hp. upright engine collects carbon on the exhaust valve in about 12 hrs. running so that this valve needs grinding. This trouble developed after engine had been overhauled. The engine was taken apart and leak-proof rings installed and the valves ground. This worked all right for a few days then it lost all compression. Detachable head holding valves were removed and valves ground again and the engine run the allotted half hour and stopped. New cylinder and piston were installed, but valves still needed grinding. In a short time old cylinder had been grooved by loose wrist pin. A new ignitor and stronger exhaust valve spring were put on but this did not stop the trouble.—Electric Light and Power Co., Fulton, S. D.

In the first place it is self-evident that the overhauling job was not properly done or the engine could not have lost its compression. The rings were not properly fitted and it is very probable that the valves were not set correctly. If the valves are set too tight when the engine is cold, the clearance will be taken up when the engine heats up with the result that the valves are held open and consequently an excess of carbon forms. If the valve spring you have installed is too stiff, the valves may be closed with so much force that the valve seats will be rounded out of shape, even if the valves do stand the constant hammering action.

OVERHEATING

Q—The engine on a Dort touring car heats. After running some time and taking cap off of the breather or oil supply pipe there is an indication of blue smoke and a slight puffing as though rings leaked. At the same time the engine never misses fire and does not foul spark plugs. Do you think it advisable to put in new rings?

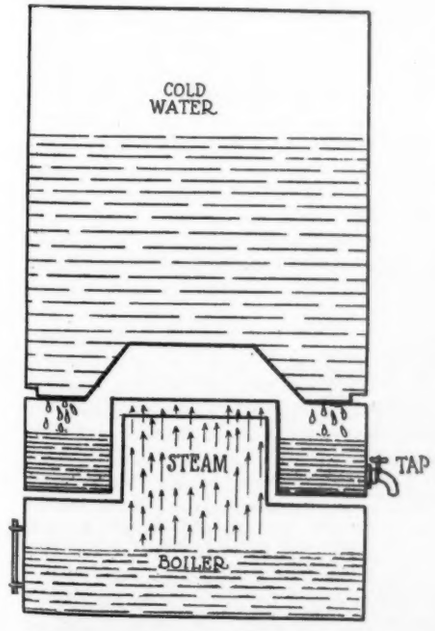


Fig. 6—Reader's design for still to distill water for storage batteries

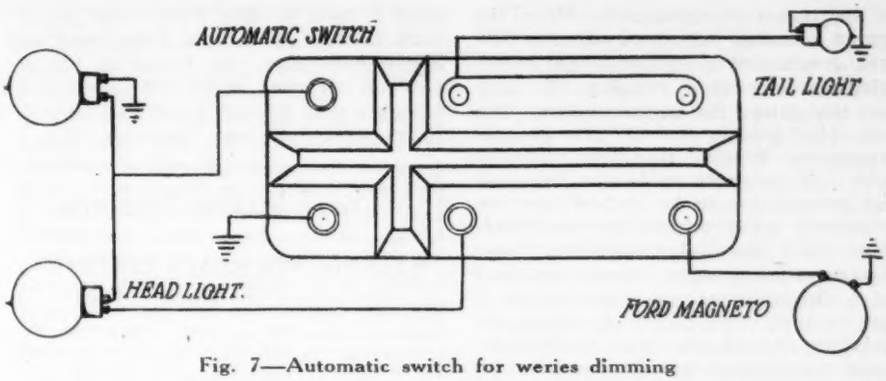


Fig. 7—Automatic switch for weries dimming

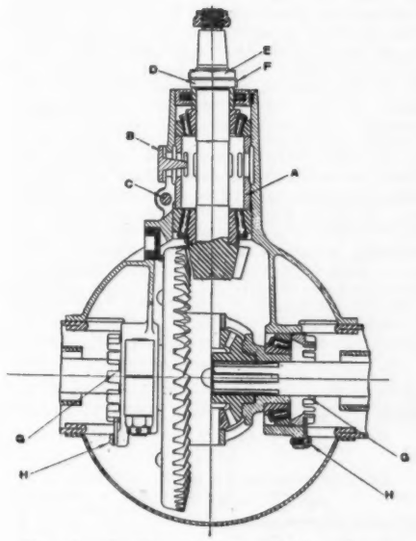


Fig. 8—Sectional view of the axle on the Case car

2—Advise of a lock switch that could be used on this car in conjunction with an Atwater Kent system.—W. L. Skeis, Centerville, Ark.

1—There are several conditions that might cause overheating that would act as described. Carbon deposit and poor seating valves seems to be the most logical cause of the trouble. However, it may be due to a retarded spark with too rich a mixture, clogged up cooling system or perhaps such a thing as dragging brakes. If the cylinders and pistons are worn it is very probable that there is a considerable formation of carbon in the cylinders as well. It may be that the loss of power is due to lack of compression and therefore we suggest that you test the compression and if you find that it is not at least 65 to 70 lb. it would be advisable to make an inspection of the pistons, rings and cylinders and make the necessary corrections to get better compression.

2—Lock switches for this system can probably be purchased from the following companies: Connecticut Telephone & Electric Co., 58 Britannia St., Meriden, Conn., Cox Mfg. Co., 3138 Payne Ave., Cleveland, Ohio, Delta Star Electric Co., 617 W. Jackson Blvd., Chicago.

WATER IN CRANKCASE

Q—What is the cause and remedy for water leaking into the crankcase of a 1919 Paige 6 using the Rutenber engine. Said trouble has existed in two cars and cars were not tampered with. Cylinder heads intact as they came from the factory. Removed cylinder head block on one gasket apparently O. K. Cleaned and oiled and replaced gasket without any results. Removed the head the second time and put on new gasket with worse results.—Wm. Lewis, Lehigh, Mont.

It seems as though you could not have completed a good job when replacing the gasket and since the conditions were worse after you fixed the gasket we are inclined to believe that root of the trouble is located right there.

There is a possibility that the water is forming as a result of ill fitting pistons and rings. This simply means that the condensation in the crankcase will be greater particularly if you are running on a rich mixture. A very small amount of water is formed at all times as it is one of the products of combustion. It exists in the cylinder in the form of steam. It is not impossible that you will find the water from the cooling system is getting into the crankcase through a leak of some kind.

COUNTERBALANCES

Q—Will the Dunn counterbalance for Fords work as they should after light weight pistons have been installed or do regular Ford pistons give the best results?—John H. Biggs, Queen City, Mo.

The Dunn counterbalances for Fords are not designed to balance the reciprocating parts but to overcome the static unbalance of the crankshaft. If properly installed the balances will prove very satisfactory.

ENGINE MISSES

Q—There are about eight or ten Model 34 B Oakland cars in this neighborhood. All of these cars hit on four or five cylinders and none of the garagemen have been able to fix them permanently. One car in particular has been in my own shop. This car was overhauled, new step rings installed, they were fit to about 1/32 in. gap. Also a new stock Marvel was installed. The ignition system has been checked over and have tried different timing of the ignition; that is, advancing it some but it has not improved matters any. Now I desire to install new valve springs, which the owner thinks causes the trouble. Have suggested installing gray iron pistons in place of the aluminum ones that are now in the engine. Would you recommend this? After overhauling this Oakland it worked perfectly for about a month and since then it has begun to miss again. The cylinders and pistons seem to be in good shape, and the valves were ground in. It seems that one can get the engine to hitting right but it will not stay so. Any suggestions will be appreciated. —W. B. Young, Young's Garage, Florence, Ariz.

It is impossible for us to suggest remedies for the trouble as you have given no description of the conditions when the missing occurs. The first question is:

is the piston pumping oil? Since the engine operates very well after it has been overhauled it is certain that something develops after running for some time that causes the engine to miss. The only thing we can do is to give general causes for missing that are likely to occur. Worn valve guide that leaks oil and permits air to be sucked into the cylinders; leaky plugs; poor compression; loose manifold connections; poor carbureter adjustment; faulty ignition; valve clearance set when the engine is cold so that when heated the clearance is taken up and the valve held open; faulty spark plugs that leak or have the gap too wide are common reasons for misfiring.

You will have to go over all of these things carefully until you find the root of the trouble. We are not in a position to make any recommendations with regard to the installation of cast-iron pistons in the place of aluminum pistons but we can say the installation of this kind have been made and have proved satisfactory. Be sure and get the cast-iron pistons as light weight as possible if you intend to use them, because the more nearly you get to the weight of the aluminum pistons, the more nearly you will come to obtaining the conditions for which the bearing have been designed.

READER'S SUGGESTION

Editor Motor Age—The diagram herewith is, perhaps, the easiest working cutout which can be bought or made. To start remove screws holding flapper and remove same. Next, remove old spring then saw off shaft to just allow a washer and then drill small hole for cotterpin. Assemble same, then replace on cutout, loosen nut on flapper arm and turn towards engine until it sets directly on dead center. When it is half open, tighten nut, take a screen door spring and fasten to rod that is used instead of cutout pedal draw at a tension which will snap it open or shut when lever passes dead center—¼ in. rod being used as cutout controller. By threading top of rod and screwing on an old accelerator button a neat job will result.—Walter S. Crays, Central Garage, Checotah, Okla.

The Electric System

MAGNETO TERMINALS REVERSED

Q—We have in our garage a Maxwell 25, that has on it a Simms magneto using four dry cells in starting which has the terminals on the breakers box marked positive and negative. We find on this car that we have to work the negative wire on the positive terminal, vice versa. Why does this magneto work this way? We have several other cars here that work the other way and we have checked up the wiring on this car and find that the same or the negative wire which goes through the starting switch and from there to the type D coil is the same as is on the other Maxwells. We changed the wires at the battery end. This car has a little tag attached to it on which is written "attach negative wire to positive wire." We also tested out the primary winding of this magneto with a volt meter and a six volt storage battery and this winding registered four volts and on a Bosch magneto tested only two volts. Is this primary winding bad? This car runs very well for about five miles, then it starts skipping but works good with another magneto. What voltage should this primary winding test out with a six volt storage battery?—A. D. Sligh, Durham, N. C.

In view of the fact that special instructions accompany this car, stipulating that the negative wire should be attached to the positive terminal, it seems to us that the switch or one wire has been reversed, which makes it necessary to carry this reverse order through. The actual flow of the current with the wire reversed is probably just as it should be except that it flows through the switch or some wire in reverse order.

It seems that part of the primary winding is shorted out on this magneto, which accounts for the low reading of the meter. If all the winding were in the circuit, the drop would be somewhat higher.

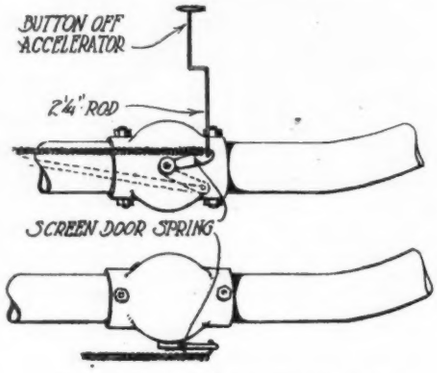


Fig. 10—Reader's suggestion for cut-out

STEPHENS WIRING SYSTEM

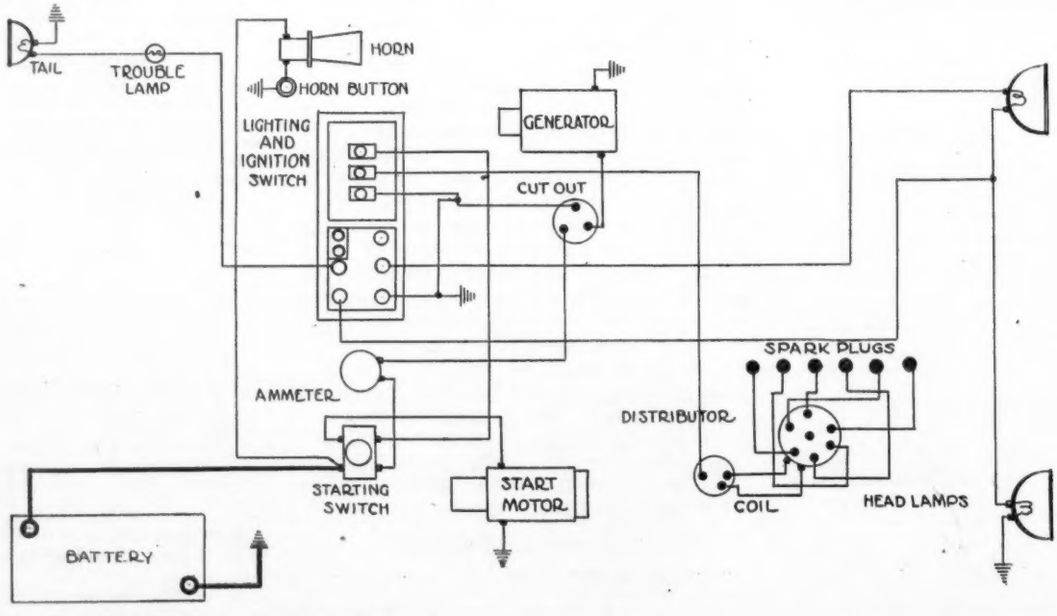
Q—Publish wiring diagram of the 1917 Stephens Salient Six, Model 65.—James B. Collins, Aberdeen, S. Dak.

Auto-Lite system used on the 1917 Stephens Six, model 65 is shown in Fig. 9.

SERIES DIMMING

Q—Publish wiring diagram for a 1919 Ford whereby an 18-volt tail light could be cut in with the headlights for dimming purposes.—Jos. R. Tate, Harrisburg, Ill.

Instead of attempting to connect an 18-volt tail light in series with the headlights we suggest connecting the headlights in series for dimming purposes. This will require the use of a special automatic switch for series dimming. Fig. 7. shows the connections to be made Switches may be purchased from the following concerns: Connecticut Telephone & Electric Co., 58 Britannia St., Meriden, Conn., Cutler Hammer Mfg. Co., 890 St. Paul Ave., Milwaukee, Wis., Aid Mfg. Co., 2625 Stewart Ave., Chicago. When writing for the switch specify what it is to be used for and the company will furnish full details for the installation.



1917 STEPHENS 65 AUTO LITE SYSTEM

Fig. 9.

Carburetion

CARBURETER TROUBLE

Q—What can be done to overcome the choke of a Tillotson carbureter used on an Overland 83 B. The carbureter causes the engine to miss at any adjustment at a speed above 12 m.p.h. The engine and ignition are in perfect mechanical condition.

2—Can a Tillotson carbureter such as is used on the Overland 85-4 be successfully installed on this model?—C. E. Pries, Chanute, Kans.

1—In the first place, are you sure that it is the carbureter that is at fault. If the engine fails to run satisfactorily, regardless of carbureter setting, it may be that the manifold is causing trouble. The condition of fuel at the present time is so poor that there is a great deal of condensation and, of course, the longer the manifold, the more chance there is

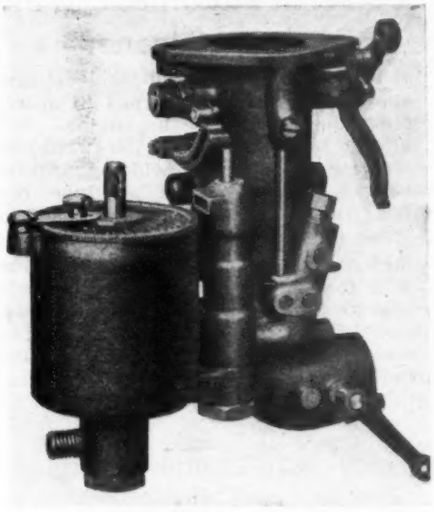


Fig. 11—Plain tube Ball and Ball carbureter as used on the 1920 Mercer

of greater condensation that results in loading in the manifold. In some cases carbureter companies have recommended changes in jet sizes so it is not impossible that the carbureter is not handling the fuel properly.

The fact that the running conditions do not change, regardless of the setting, leads us to believe that the fault may lie somewhere else. Are the feed pipes clean and in good condition? Is the compression low? Are the valve guides in good condition and the valve stems fitting well or is air permitted to enter the cylinder directly? Are the manifold connections tight?

Since we do not know what kind of misfiring you are getting, that is, whether it is just a case of irregular running or whether the same cylinder is missing all of the time, it is impossible for us to do anything but suggest the possibilities. We advise shortening the manifold and installing a hot spot if possible.

2—These carbureters can undoubtedly be placed on either model of car but we do not believe that you get any better running conditions if it is the carbureter that is at fault on the model 83 B.

the designers when it leaves the factory. Often times dirt and scale will clog the filter and cause the engine to pop and miss. Water may also cause the trouble. Clean the carbureter and pipe thoroughly.

The carbureter may be taken apart for cleaning and put together again without fear of disturbing the adjustment. If cleaning is necessary, be sure to have the float cover well seated, the needle valve seat and various jets screwed down tight, and the butterfly throttle fastened properly on the shaft, so that it may open fully. When closed the lower edge of the butterfly throttle should cover the idling hole.

The choke, as indicated in the illustration, is held in place by a screw and can be easily removed after the butterfly throttle has been removed. The main jet and compensator can be removed after unscrewing the lower plug. If after cleaning the carbureter and pipes thoroughly, and making the idling adjustment, you find that the trouble still exists, we advise taking the matter up with the manufacturers, explaining in detail the conditions under which the truck is being run.

TRUCK CARBURETER

Q—Instruct how to adjust the carbureter on a Mack truck.—Philip J. Kenny, New York City.

Since we do not know what model truck you have or in what year it was made we are going to assume that it is one of the new models using the Zenith carbureter.

In the Zenith carbureter, the quality of the mixture is fixed by the choosing of three variables: choke tube, main jet, and compensator. The size number of these three parts constitute what is called setting. The size number is stamped on each part. The chokes are numbered in millimeters according to the size of their smallest diameter. The jets and compensators are numbered in hundredths of a millimeter.

There is some slight differences of construction in the various models, but the general instructions are applicable

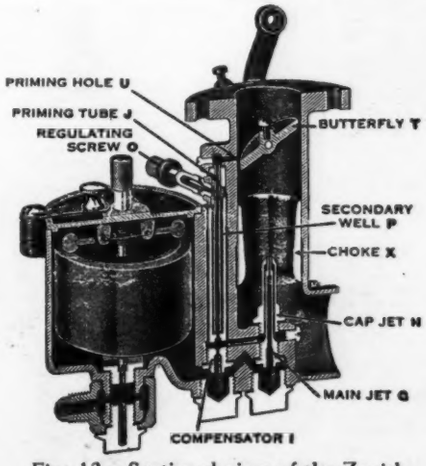


Fig. 12—Sectional view of the Zenith carbureter used on the Mack truck

to all of the models. For example we will take the model L. Refer to Fig. 12. At low speed, when the butterfly throttle valve T is nearly closed, the main jet and cap jet give but little or no gasoline, but, as there is considerable suction on the edge of the butterfly, the gasoline is drawn through the idling device. This device consists of the idling tube J within the secondary well P inserted in the first well, at the bottom of which the compensator I is located.

The only adjustment that may be useful is the slow speed adjustment. The strength of the suction in the idling tube can be diminished by "turning out" screw O, thus admitting more air. Turning the screw O in, increases the effect of the suction and causes the jet to flow more gasoline, making the mixture richer.

It is to be remembered that this adjustment varies the idling mixture only and has no effect upon the high speed action. We assume that when the carbureter is furnished as standard equipment for a car or truck that the setting is correct and according to the wishes of

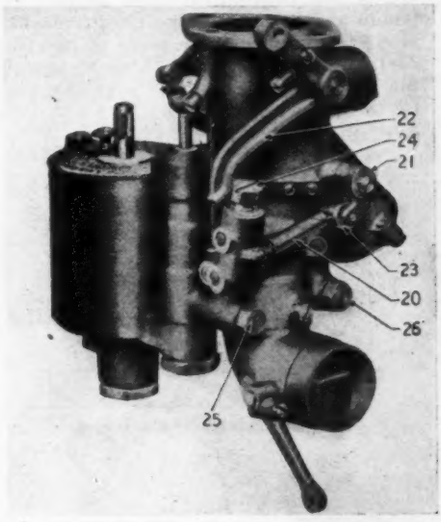


Fig. 13—Plain tube Ball and Ball carbureter showing low speed adjustment

BALL AND BALL CARBURETER

Q—Publish adjustment of a Ball and Ball carbureter as used on the 1920, series five, Mercer.—Kokomo Tire Sales Co., Jacksonville, Fla.

The Ball & Ball carbureter employed on the 1920 Mercer is non-adjustable as to running conditions. There is nothing that can be done to this carbureter that will in any way change the performance. By this, we wish to confine ourselves to adjustments as ordinarily provided. Of course, any one may drill out the gasoline passages and so increase the flow of gasoline, but this is a procedure not recommended. One factor in connection with the gasoline can be varied but this does not change the high speed performance. It affects only the low speed or idling and when the throttle is opened the action of this jet ceases to affect the engine. Fig. 13 shows the carbureter. Part designated with 24 is the low speed screw and this may be turned either way to increase or decrease the richness of the mixture.

The Accessory Show Case

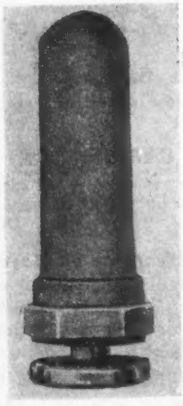
New Fitments for the Car

Harward Piston Ring

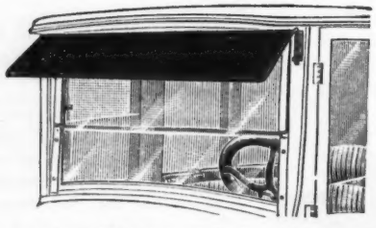
THE Harward Piston Ring is a one-piece concentric ring which is quick seating and is claimed will give perfect contact against the cylinder wall. The rings are machined both inside and outside, thus providing uniform thickness and stiffness. The eccentric groove on the inside of the ring is cut in such a manner that it is claimed the ring will expand and contract in a true circle, providing even pressure against all sides of the cylinder.

The Harward is also provided with oil pockets which is claimed fill with oil and form a seal around the cylinder and which will prevent oil from passing the piston and under average conditions will stop oil pumping. The price of the ring varies from $1.15 to $1.75 each depending upon the size. It is manufactured by the Harward Mfg. Co., 3939 Magnolia Ave., St. Louis, Mo.

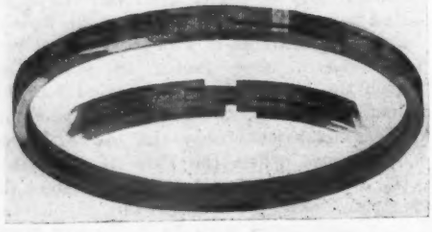
Porter Safety Neutral Stop



Left—Jiffy Dust Cap for Tire Valve



Auto-Vizor on a Closed Car



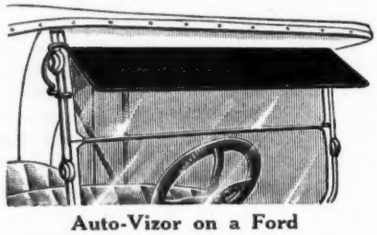
The Howard Piston Ring. A One-Piece Ring With an Exceptionally Good Joint

Autovizor

The Autovizor is a device to be attached to a windshield for the purpose of preventing glare from the sun or headlights. It can be furnished in solid colors of black, dark green and tan, in three types for open body, closed body and the Ford. Its construction is such that it can be adjusted to any width of body, 36 to 44 in. The coverings are self-adjusting to width of frame which is solid steel and also adjustable. The Autovizor is manufactured by Wedler-Schuford, 320 N. 19th St., St. Louis, and lists at $6.75 to $7.25 f. o. b. factory.

Porter Safety Neutral Stop

The Porter Safety Neutral Stop, illustrated herewith, is designed so that in case of emergency, the car will stop if both feet are jammed down. The tendency, in case the driver is confused, is to put both feet down and in the case of a Ford without a protective device of this kind, the car would naturally be thrown into first speed and at the same time the brake would be applied. The illustration shows its action. It is a product of the Porter Products Corp., Syracuse, N. Y.



Auto-Vizor on a Ford

Right—The Asko Plug Uses a Stone Insulator

Jiffy Dust Cap

The Jiffy Dust Cap illustrated herewith is made of rubber, dust and waterproof and can be slipped on and off the valve stem in an instant. It is a time saver and will prevent a display of unnecessary language on some occasions. The retail price as listed by the Barton Mfg. Co., Flint, Mich., is 15 cents each or 50 cents for a set of four.

Folberth Automatic Windshield Cleaner

The automatic windshield cleaner, shown herewith, is designed to operate from the suction of the engine. It is slipped on the top of the windshield frame and securely held by two set screws. A flexible rubber tube runs from the cleaner through the dash, and is connected to the intake manifold by means of fittings which are furnished with the cleaner. The cleaner is set in operation by a convenient finger control and this allows both hands to be free for steering, shifting gears, etc. It is manufactured by The Folberth Auto Specialty Co., Cleveland.

Asko Spark Plug

The Asko spark plug, shown herewith, is claimed to prevent the formation of carbon on any of the vital parts. The body of the plug is made of brass and provided with a stone insulator of large size. The central electrode is made of monel steel and is non-corrosive. There are two ground electrodes, as shown in the illustration. It is claimed the sparks from the central electrode alternate from one electrode to the other playing up and down the firing surfaces of both electrodes. The plug is a product of the Allen Specialty Co., 2721 West Lake St., Chicago, Ill., and the list price is $1.50.

Folberth Automatic Windshield Cleaner

Service Equipment
Time Savers for the Shop

Wood's Grease Injector

THE Wood's Injector, illustrated herewith, pumps heavy engine oil and grease measuring one quarter pound of grease at each stroke of the plunger. It holds twenty-two pounds of grease and operates with one hand. The container and cover are made of 24 gage metal and the bottom is re-inforced with a cold roll steel plate. The barrel is of 20-gage welding steel tubing and screws into stuffing box which is machined from steel. Its operation is a valveless action which cannot be clogged by small chips, pieces of waste, etc. It is manufactured by the A. J. Wood Mfg. Co., Grand Rapids, Mich., and sells for $7.

Ambu Solder Iron

The Ambu Solder Iron is an inexpensive tool adapted to service station work and operates from a storage battery. The iron complete consists of 3 ft. of rubber covered braided wire with a clamp for attaching to battery, a 3 ft. connecting wire with two clamps, six carbon points a piece of wire solder and one 2-ounce can of Ambu solder paste.

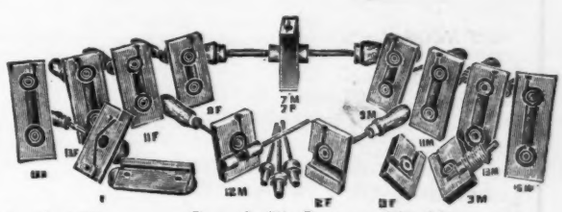
The illustration shows the soldering iron in use putting a test point handle on a wire. One terminal of the battery is connected to the vise and the connection on the iron goes to the other terminal. The battery circuit is completed by the carbon tip of the iron where the heat is needed only when the tip comes in contact with the work to be soldered. This eliminates possibility of using current when the iron is not in use providing care is taken to prevent the point from coming in contact with metal. The price of this outfit as listed by the American Bureau of Engineering, Inc., Chicago, is $5.

Campbell Battery Moulds

The complete set of Campbell Battery Moulds illustrated consists of five connector moulds for the following sizes—7-9-11-13 and 15 plate cells; one terminal mould with 4 adaptors, which enables one to cast two positive and two negative terminals right or left, covering practically all taper terminals; one post mould, to cast two sizes of posts, with plate strap; one cable mould, to cast lead terminal on the two most poular size cables; one terminal screw mould, to cast two sizes of terminal screws 5/16 in. and 3/8 in.

This kind of a set is a very valuable addition to equipment of any battery service station. It will enable them to give better service without a considerable investment in new parts and will eliminate the delays waiting for parts to come from the factory.

The Campbell Engineering Co., Kansas City, Mo., lists this set complete, dealer's price at $66.



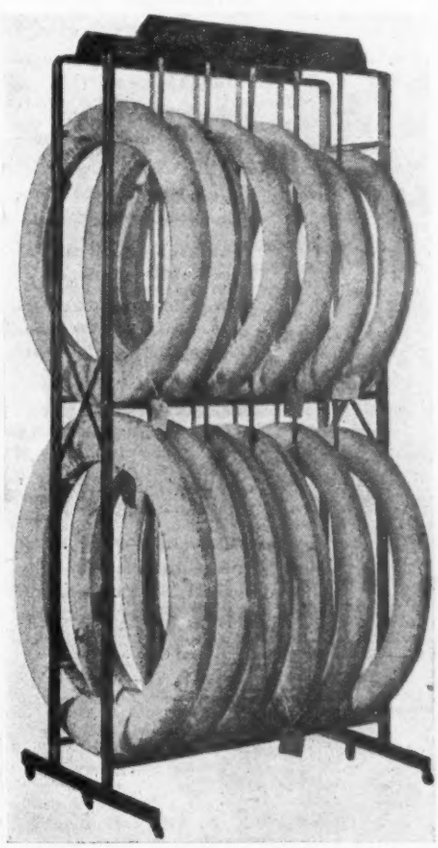
Campbell's Battery Moulds

Crackerjac Tire Rack

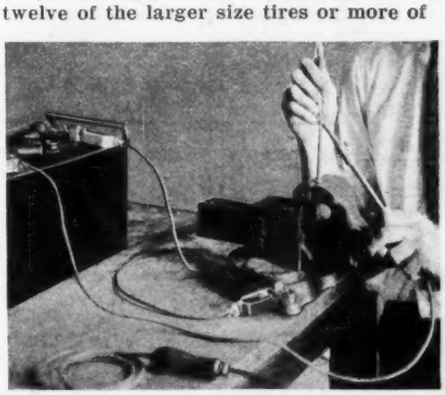
The tire rack, shown in the illustration, is a portable rack which takes up very little space and will accommodate twelve of the larger size tires or more of the smaller tires. The height of the rack is 80½ in., the width 40 in., depth between uprights 14 in. and the space between sections 6½ in. A rack of this kind will enable a service station to keep the tires in good condition where they can be seen and where they can be taken out of stock immediately. The rack is listed at $18 by the Fort Dearborn Mfg. Co., Sterling, Ill.

Do you know that the tar removers you sell to motorists with which to clean up their machines after a battle for taking tarred roads is also one of the best things obtainable for taking ordinary house paint off glass? Those who have cleaned the windows of a new house or a newly painted house will appreciate this.

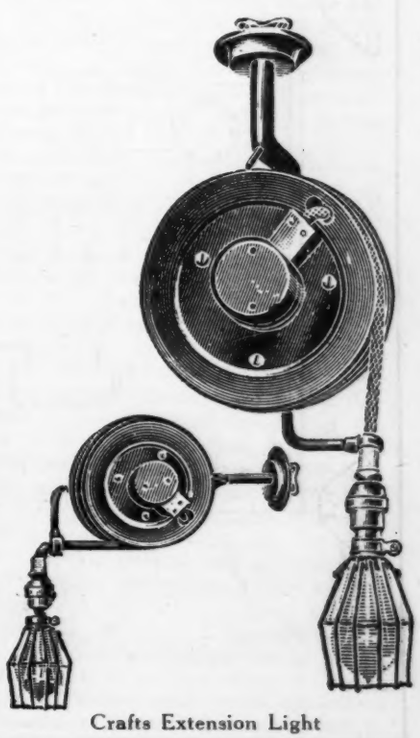
If accessories dealers will advertise their line of tar removers for this purpose, they will soon find themselves serving customers who do not own an automobile and never expect to own one.



Crackerjac Tire Pack

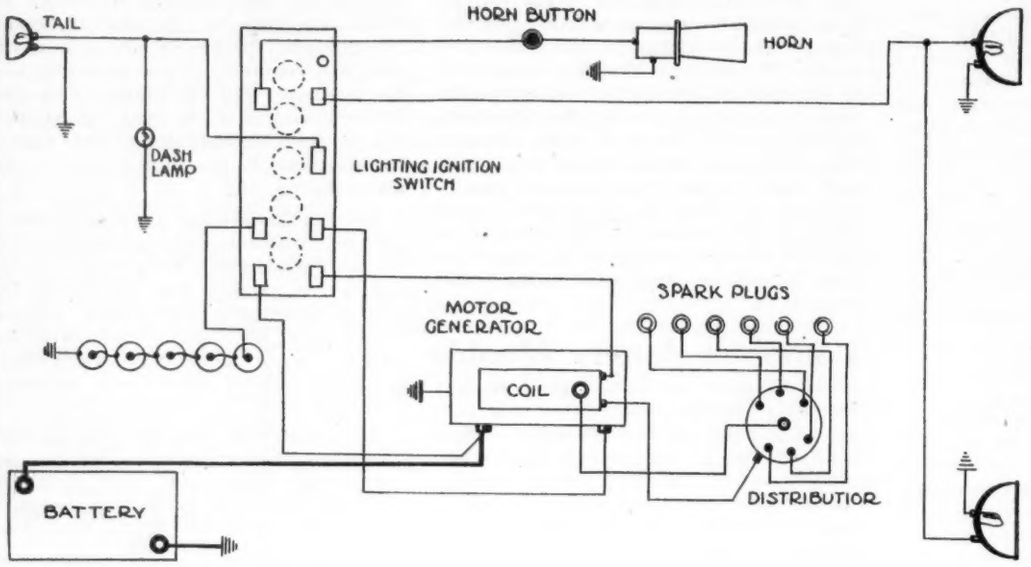


Ambu Solder Iron

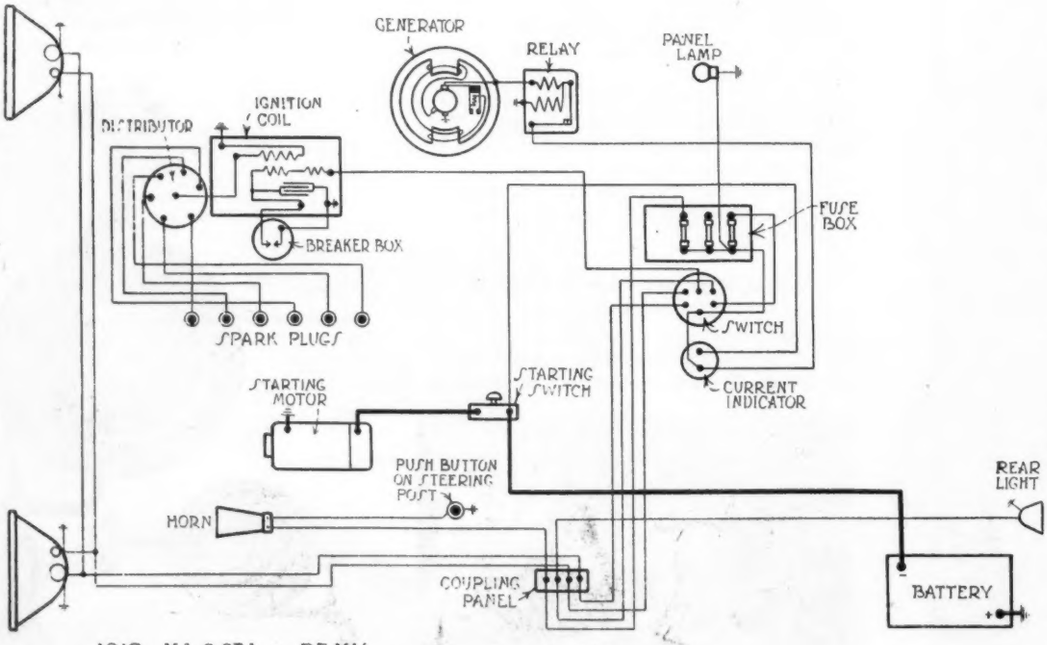


Crafts Extension Light

Motor Age Weekly Wiring Chart No. 91



1915 MOON 4-38-64-40 DELCO SYSTEN



1919 KISSEL REMY

Name of car and date on which wiring diagrams have appeared in previous issues

Allen—June 17, '20
Apperson—Aug. 5, '20

Briscoe—May 6, '20
Buick—July 15, '20

Case—Aug. 5, '20
Chalmers—June 17, '20
Chandler—May 20, '20
Cole—June 10, '20
Crow-Elkhart—July 29, '20

Davis—Aug. 12, '20
Dort—Aug. 12, '20

Elcar—May 6, '20

Franklin—June 3, '20

General Battery Charging—Sept. 15, '19
General Magneto Diagram—June 15, '19
Grant—Aug. 12, '20

Harroun—July 15, '20
Haynes—June 24, '20
Hupmobile—May 27, '20

Internal Connections—July 10-17-24, '19

Jeffery—May 13, '20
Jordan—June 10, '20—July 22, '20

King—May 20, '20
Kissel—May 27, '20

Lexington—July 29, '20
Locomobile—June 6, '20

Moline-Knight—May 20, '20—July 22, '20
Moon—July 8, '20—July 29, '20

Peerless—May 13, '20
Pierce-Arrow—July 15, '20

Reo—July 22, '20
Roamer—Aug. 5, '20

Studebaker—July 1, '20
Stutz—July 8, '20
Special Systems for Fords—May 15-22, '19

Law in Your Business

By Wellington Gustin

SEEMINGLY knotty legal problems are constantly arising in the dealer's business, which even a slight knowledge of the law easily may solve. MOTOR AGE presents here the most common legal problems which confront the dealer. Mr. Gustin, a member of the Chicago bar, not only is well versed in the law relating to the dealer, but presents it in such a way as to be readily understood by the layman. In addition to his articles, Mr. Gustin will gladly answer such individual inquiries on knotty problems as may be submitted to him.

Releasing Surety Did Not Extinguish Lien

IN PASSING on the priority of linens against an automobile, one lien being an attachment of debt, and the other a lien of chattel mortgage previously given, the Supreme Court of Iowa has enunciated the following principles in the case of Persinger Garage versus Caminsky, 176 N. W. 794.

"If the debt for which a chattel mortgage was given to secure is paid, the mortgage necessarily ceases to be a lien upon the property; but where a note secured is destroyed and a new note is executed, the lien of the mortgage still remains, if the parties intend that the debt and the lien of the mortgage as security therefor be continued and not extinguished.

"Where the maker of the note executed a chattel mortgage to protect one who signed the note as surety, and a bank assigned the note to a third party and the surety assigned the mortgage to the same person, and defendant gave such check for the amount of the note and the mortgage was assigned to him, and the surety destroyed the note and the maker of the old note executed the new note to defendant without the surety joining the lien of the mortgage was not extinguished by reason of the release of the surety from liability."

Again the court said that an assignment of a chattel mortgage to a third person paying the amount of the indebtedness to the credition is evidence of an intention to purchase the mortgage and not to pay the indebtedness.

Since the court found that the chattel mortgage on the automobile in question was given prior to the attachment for debt, and that such mortgage had never been released or extinguished, judgment was given in favor of the mortgage holder.

Car Confiscated by Federal Authorities

We understood that in an issue of MOTOR AGE about thirty or forty days ago, there was an article which stated that in some place in Ohio the courts had held that where a mortgaged car was seized by the Federal authorities for illegal use, such as boot-legging, that the party holding the mortgage being unaware of the use the car was put to, should not lose the amount of the mortgage by the car being confiscated by the Government, but the equity only of the offender in the car being confiscated. In February we sold an Oakland automobile to a man here who was Deputy Sheriff and acting as bailiff to the Grand Jury and he was in good standing in the community.

Last week he was caught boot-legging and the car was confiscated by the Federal authorities and we hold a mortgage on said car which is unsatisfied in the sum of $456.00.

We will appreciate it if you can refer us to the Ohio case or any other case that will help us in this matter.—Wilson-Felder Motors Co., San Antonio, Tex.

You have the right impression as to the forfeitures under the Volstead Act for the illegal transportation of liquors.

From your statement you are entitled to enforce your mortgage lien against the car out of the proceeds from the sale of same by the Government. The law is plain in this matter and it is clearly not the intention to injure bona-fide business deals. Only the interests of guilty parties under the law are intended to be reached. Mortgage and liens made in good faith may not be forfeited by the United States Government.

The law is too plain in that point to require a decision. However, the case of the United States vs. McMasters (Moran, Intervener) in the U. S. District Court at St. Louis, 264 Federal Rep. page 250, may aid you in getting your claim properly before the court. The points to be kept in mind are that you must prove your lien or mortgage by competent evidence before the court; that the notes which are secured by the covering mortgage have proper revenue stamps; and that the mortgage is properly filed or recorded.

If these things are done you should have no trouble in having your claim allowed, if indeed, you might not be able to persuade the marshal to turn the car over to you, in case the Government's sale of the car would reduce the proceeds below the amount of your claim.

The Livery Stable Versus the Garage

RESTRICTIONS AGAINST LIVERY HELD NOT TO APPLY TO GARAGE —LOCATING THE GARAGE SITE

THAT restrictions against the maintenance of a stable "omnibus, livery or cow stable" do not apply to a garage, has been held in the Appellate Division of the New York Supreme Court. (181 N. Y. 559)

In this case, the covenant in a deed to the property in controversy, prohibited the erection of buildings thereon for carrying on various trades and occupations commonly described as nuisances, including "omnibus, livery or cow stable" and terminating with the words "or other dangerous, noxious, unwholesome or offensive establishment, trade, calling or business whatsoever offensive to the neighborhood."

The deed was made in 1850 and the court said the parties could not have had in mind a garage for the storage of automobiles. The words, "omnibus, livery or cow stable" did not apply to the garage. In interpreting the general prohibition of other "dangerous, noxious, unwholesome or offensive establishment, trade, calling or business," we must consider the other words "offensive to the neighborhood."

The court said there was no evidence that the defendant's garage has been, is, or will be offensive to the neighborhood.

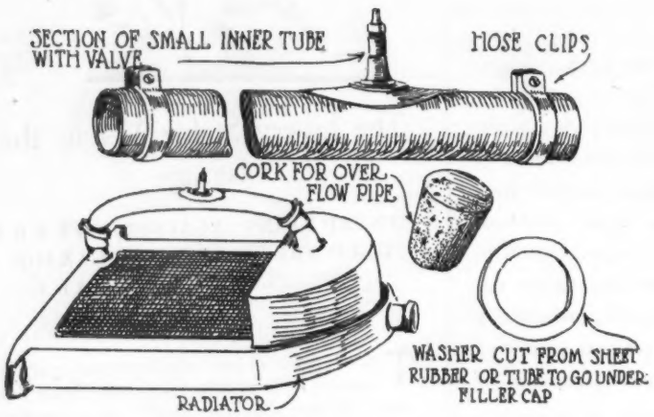
That this garage was not offensive to the neighborhood was due to conditions prevailing in the block. It is obvious that if the block were filled with fine residences, a garage would be offensive.

In dissenting to the judgment in the case, Justice Blackmar said that the prohibition against the maintenance of the garage is not found in the use of the word "stable" in the deed, but by the general clause against offensive business, which means, in this case, a business that is offensive in the same way that a stable is offensive.

The general rule is that covenants in deeds to lands are enforceable by specific performance, but it is a defense to such enforcement to show a changed condition of the neighborhood which makes it inequitable to enforce them. This is a highly important rule to be considered in locating a garage site in a new neighborhood.

The Automotive Repair Shop

Practical Maintenance Hints


SECTION OF SMALL INNER TUBE WITH VALVE
HOSE CLIPS
CORK FOR OVER FLOW PIPE
WASHER CUT FROM SHEET RUBBER OR TUBE TO GO UNDER FILLER CAP
RADIATOR

Holding air pressure inside the radiator when it is immersed in water to detect leaks

Detecting Leaks When Repairing Radiators

To enable the radiator repairman to hold air pressure inside of the radiator when it is immersed in a tank of water, the method shown in the sketch is simple and much shorter than some methods now used. This consists mainly of attaching a section of inner tube with valve attached to the upper and lower hose pipes. Hose clips of the usual type or pieces of twine are used to secure the tube to the openings. The filler cap is closed by means of a plain rubber washer also cut out of a section of tubing. A small cork is the means of plugging the overflow pipe. It is a very easy matter with the radiator openings closed to put the tire pump on the valve and put in six to seven pounds of air. Inasmuch as the tube is elastic quite a volume of air can be pumped in without endangering the radiator.

Frequently an inner tube that is damaged beyond repair will be found that is suitable for this purpose.

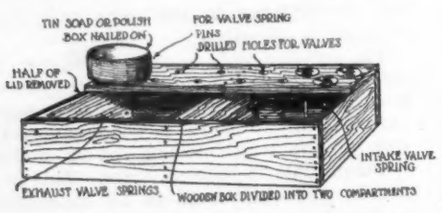
Ratchet Wrench Made From a Gear

A small gear about 3 in. in diameter, unserviceable because of wear, can be converted into a useful ratchet wrench by following the sketch.

Make a center pivot or shaft to fit the bore of the gear, drill and square up the center of this piece to the size of the square rod used with socket wrenches or to the size of drill sockets, as is desired.

For the handle use a strip of sheet steel about 2 in. wide, $\frac{3}{16}$ to $\frac{1}{4}$ in. thick by 18 in. long. Bend this at the center and drill to accommodate the gear pivot.

Make a catch as is shown, using a riveted pin to hold it in place. A light spring is fastened to the catch and to one side of the handle. The gear shaft must either be a drive fit on the gear or an additional pin inserted through the gear to prevent the shaft dropping out. The keys prevent it from rotating. The ratchet is reversible by turning it over.


TIN SOAP OR POLISH BOX NAILED ON
FOR VALVE SPRING PINS
DRILLED HOLES FOR VALVES
HALF OF LID REMOVED
INTAKE VALVE SPRING
EXHAUST VALVE SPRINGS
WOODEN BOX DIVIDED INTO TWO COMPARTMENTS

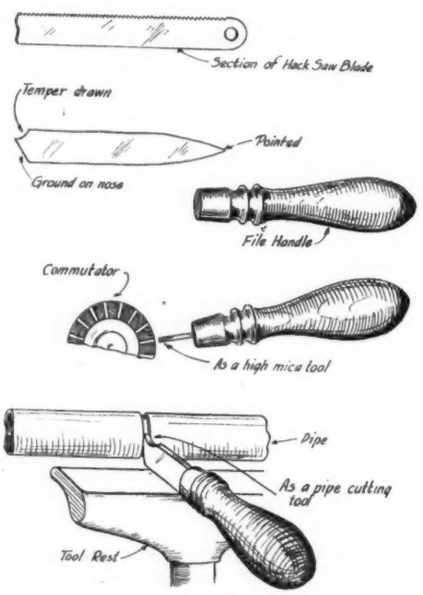
Holder for valves and parts

Holder for Valves and Parts

Every repairman knows the advisability of replacing each individual valve into the port from which it was removed. This is necessary even after grinding a valve to a seat. Frequently valves are placed in rotation on the top of the work bench, and as often they are handled by someone who replaces them incorrectly.

To provide against mixing up the pieces, secure a long, narrow box, remove half of the top and put a partition in the middle. Drill the top with twelve half-inch holes and nail on one end the bottom of a circular tin soap or polish box. This box is to be used for the small pins that hold the springs in place.

The holes in the lid are for the valve stems, one-half of the inside of the box is for the exhaust valve springs, while the other half is for the intake springs, which it is advisable to keep separated.

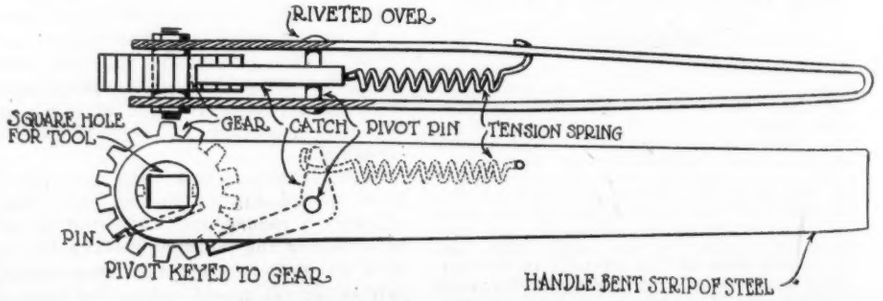


Pipe cutter and high mica tool

Pipe Cutter and High Mica Tool

The tool, shown in the sketch, is serviceable either for cutting off brass pipe in the lathe or for undercutting mica in the commutator of motors or generators. This tool is made from a piece of hack saw blade ground down to a point at one end and sharpened on the other end. The temper of the steel is drawn first by polishing one side of steel and placing it lightly against a heated piece of iron.

When the color of the saw blade comes to that of dark straw, plunge in water.



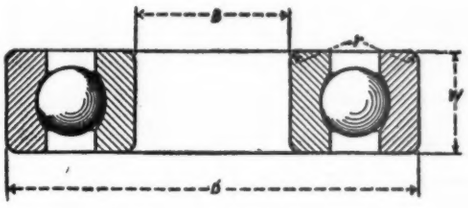
Ratchet wrench made from a gear

Dimensions and Numbers of Standardized Ball Bearings

Motor Age Maintenance Data Sheet No. 110

Heavy Series

Bearing Number	Bore				Outside Diameter				Width[1]		Minimum Corner Radius		Eccentricity Tolerance, In.	
	Mm.	In.	Inch Tolerance		Mm.	In.	Inch Tolerance		Mm.	In. +0.0000 −0.0050	Mm.	In.	Inner Race	Outer Race
			Plus	Minus			Plus	Minus						
403	17	0.66929	0.0002	0.0004	62	2.44095	0	0.0008	17	0.66929	1	0.04	0.0006	0.0012
404	20	0.78740	0.0002	0.0004	72	2.83465	0	0.0008	19	0.74803	2	0.08	0.0006	0.0012
405	25	0.98425	0.0002	0.0004	80	3.14962	0	0.0008	21	0.82677	2	0.08	0.0008	0.0012
406	30	1.18110	0.0002	0.0004	90	3.54332	0	0.0008	23	0.90551	2	0.08	0.0008	0.0012
407	35	1.37795	0.0002	0.0004	100	3.93702	0	0.0008	25	0.98425	2	0.08	0.0008	0.0012
408	40	1.57481	0.0002	0.0004	110	4.33072	0	0.0008	27	1.06299	2	0.08	0.0008	0.0012
409	45	1.77166	0.0002	0.0004	120	4.72443	0	0.0008	29	1.14173	2	0.08	0.0010	0.0016
410	50	1.96851	0.0002	0.0004	130	5.11813	0	0.0008	31	1.22047	2	0.08	0.0010	0.0016
411	55	2.16536	0.0002	0.0004	140	5.51183	0	0.0008	33	1.29921	3	0.12	0.0010	0.0016
412	60	2.36221	0.0002	0.0005	150	5.90554	0	0.0012	35	1.37795	3	0.12	0.0010	0.0016
413	65	2.55906	0.0002	0.0005	160	6.29924	0	0.0012	37	1.45669	3	0.12	0.0010	0.0016
414	70	2.75591	0.0002	0.0005	180	7.08664	0	0.0012	42	1.65355	3	0.12	0.0010	0.0016
415	75	2.95277	0.0002	0.0005	190	7.48035	0	0.0012	45	1.77166	3	0.12	0.0010	0.0016
416	80	3.14962	0.0002	0.0005	200	7.87405	0	0.0012	48	1.88977	3	0.12	0.0012	0.0018
417	85	3.34647	0.0002	0.0006	210	8.26775	0	0.0012	52	2.04725	3	0.12	0.0012	0.0018
418	90	3.54332	0.0002	0.0006	225	8.85830	0	0.0012	54	2.12599	3	0.12	0.0012	0.0018
419	95	3.74017	0.0002	0.0006	250	9.84256	0	0.0012	55	2.16536	3	0.12	0.0012	0.0018
420	100	3.93702	0.0002	0.0006	265	10.43311	0	0.0012	60	2.36221	3	0.12	0.0012	0.0018



Dimensional key to bearing tables

Medium Series, Extra Large

No.	B		D		W of Individual Ring		r Corner Radius Min.	
	Mm.	In. +0.0002 −0.0006	Mm.	In. +0.0000 −0.0012	Mm.	In. +0.0000 −0.0050	Mm.	In.
324	120	4.7244	260	10.2362	55	2.1654	4	0.16
326	130	5.1181	280	11.0236	59	2.3228	4	0.16
328	140	5.5118	300	11.8110	63	2.4803	4	0.16
330	150	5.9055	320	12.5984	67	2.6378	4	0.16
332	160	6.2992	340	13.3858	71	2.7953	5	0.20
334	170	6.6929	360	14.1732	75	2.9528	5	0.20
336	180	7.0866	380	14.9606	79	3.1102	5	0.20
338	190	7.4803	400	15.7480	83	3.2677	5	0.20
340	200	7.8740	420	16.5354	87	3.4252	5	0.20
342	210	8.2677	440	17.3228	89	3.5039	5	0.20

Eccentricity tolerances: inner race, 0.0012 in; outer race, 0.0018 in.

Extra Small Series

Bearing Number	B		D		W Of Individual Rings		Corner Radius Min.	
	Mm.	In. +0.0002 −0.0004	Mm.	In. +0.0000 −0.0005	Mm.	In. +0.0000 −0.0050	Mm.	In.
9430	4	0 15748	16	0.62992	5	0.19685		0.02
9431	5	0.19685	19	0.74803	6	0.23622	0.5 0.5	0.02
9432	6	0.23622	19	0.74803	6	0.23622	0.8	0.03
9433	7	0.27559	22	0.86614	7	0.27559	0.8	0.03
9434	8	0 31496	22	0 86614	7	0.27559	0.8	0.03
9435	9	0.35433	26	1.02363	8	0.31496	0.8	0 03

Eccentricity tolerances: inner race, 0.0006 in.; outer race, 0.0012 in.

The definition for eccentricity was given in last week's issue. Tapered bearings and their standardized dimensions and numbers are to follow

Specifications of the Electrical Equipment Found on 1920 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR		BATTERY			Wiring System	Units Combined	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage			Type	Volts	Amp.
Allen.....43	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	Prest-O-L..	80	6	1	GI....	GT.....	6	15
American.....C	Single	Conn.....	Hand...	G & D....	6	Remy.....	6	Willard....	90	6	1	S.....	3-A.....	1.250	20
Anderson.....All	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	90	6	1	S.....	.....	.....	.....
Apperson.....All	Single	Remy.....	Hand...	Bijur.....	6	Bijur.....	6-8	Willard....	90	6	1	S.....	Open....	1.250	10
Auburn.....6-39	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	90	6	1	S.....	.....	6-8	25
Beggs.....20-T	.....	Conn.....	Hand...	A-L.....	6	A-L.....	6	Exide	90	6	1	GT...	Cart....	6	15
Bour-Davis.....21	Single	West.....	Hand...	West.....	6	West.....	6	Willard....	111	6	1	S.....	GT.....	6	15
Brewster.....	Single	Berling....	Hand...	U. S. L....	12	U. S. L....	12	U. S. L....	.....	.....	1	.....	.....	.....	.....
Briscoe.....4-34	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	Prest-O-L..	80	6	1	GI....	GT.....	6	20
Buick.....	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard	132	6	1	S.....	.....	.....	.....
Cadillac.....57	Single	Delco.....	H. & A..	Delco.....	6	Delco.....	6	Exide.....	130	6	1	GM..	.....	.....	...
Case.....V-20	Single	West.....	H. & A..	Delco.....	6	West.....	6	Willard....	111	6	1	GI....	5AGT...	50	105
Chalmers.....35-C	Single	.....	Hand...	.....	6	.....	6	.....	106	6	1	GI....	GT.....	6	15-30
Champion.....KO	Single	Delco.....	Hand...	Dyneto....	6	Dyneto....	6	Willard....	90	6	1	S.....	GT.....	6	200
Chandler.....All	Single	Bosch	Hand...	G & D....	6	G & D....	6	Prest-O-L..	105	6	1	S.....	GT.....	6	.....
Chevrolet.....All	Single	Remy.....	Hand...	A-L.....	6	A-L.....	6	Willard....	111	6	1	GI....	GT.....	6	.....
Cleveland.....40	Single	G & D....	Hand...	G & D....	6	G & D....	6	Prest-O-L..	94	6	1	S.....	GT.....	6	.....
Cole.....All	Single	Delco.....	H & A..	Delco.....	6	Delco.....	6	Prest-O-L..	.....	6	1	S.....	.....	.....	.....
Columbia.....All	Single	At-Kent...	Hand...	A-L.....	6	A-L.....	6	Prest-O-L..	80	6	1	S.....	.....	.....	.....
Comet.....C-53	Single	Wagner...	Hand...	Wagner...	6	Wagner...	6	Willard....	111	6	1	.....	.....	.....	.....
Commonwealth..42	Single	At-Kent..	Hand...	Dyneto....	6	Dyneto....	6	Prest-O-L.	105	6	1	.....	GT.....	.....	.....
Crow-Elkhart....L-55	Single	Conn.....	Hand...	Dyneto....	6	Dyneto....	6	Exide.....	120	6	1	.....	Cart....	6	10
Cunningham.....V-4	Single	Delco.....	H & A..	Delco.....	6	Delco.....	6	Willard. ..	132	6	1	.....	.....	.....	.....
Daniels.....8-D	Single	Delco.....	H & A..	Delco.....	6	Delco.....	6	Willard....	132	6	1	S.....	.....	.....	.....
Davis.....51	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	S.....	.....	.....	.....
Dixie Flyer.....	Single	Eisemann..	Hand...	Dyneto....	6	Dyneto....	6	Willard....	90	.....	2	.....	.....	.....	.....
Dodge Brothers.....	Single	Own.....	H & A..	N. E.....	12	North East	12	Willard....	49	12	1	GM..	Encl....	1-50	10
Dorris.....6-80	Single	Bosch.....	Hand...	West.....	6	West.....	6	Willard....	102	6	1	S.....	GT.....	5-8	15
Dort.....15	Single	Conn.....	Hand...	West.....	6	West.....	6	U. S. L....	85	6	1	S.....	.....	6	10
du Pont.....A	Single	Eisemann.	H & A..	West.....	6	West.....	6	Exide.....	115	6	1	S.....	.....	.....	.....
Economy.....6-46	Single	Own.....	Hand...	A-L.....	6	A-L.....	6	Willard....	84	6	.....	.....	.....	.....	.....
Elcar.....All	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	S.....	GT.....	6-8	20
Elgin.....K	Single	Wagner...	Hand...	Wagner...	6	Wagner...	6	Willard....	90	6	1	.....	GT.....	6-8	20
Essex.....A	Single	Delco.....	H & A..	Delco.....	7	Delco.....	6	Exide.....	105	6	1	S.....	.....	.....	.....
Ferris.....	Single	Splitdorf..	Hand...	L-N.....	6	L-N.....	6	Willard....	132	6	1	S.....	.....	6-8	.....
Ford.....T*	Single	Own.....	Hand...	Own.....	6	Own.....	6	Opt.....	80	6	1	S.....	.....	.....	.....
Franklin.....9-B	Single	At-Kent...	Auto....	Dyneto....	12	Dyneto....	.....	Willard....	67	12	2	GM..	GT.....	14	10
Gardner.....O	Single	West.....	Hand...	West.....	6	West.....	6	Willard....	90	6	1	S.....	GT.....	6	20
Geronimo.....	Single	Delco.....	Hand...	Dyneto....	6	Dyneto....	6	Exide.....	90	6	1	S.....	none	6	.....
Grant.....H	Single	At-Kent...	Hand...	Bijur.....	6	Bijur.....	6	Prest-O-L..	90	6	1	S.....	2GT....	6-8	15
Hanson.....54-A	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Prest-O-L..	100	6	2	.....	.....	.....	.....
Harroun.....	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Prest-O-L..	80	6	1	.....	.....	.....	.....
Harvard.....4-20	.....	At-Kent...	.....	Wagner...	6	Wagner...	6	Nat. Carb.	.....	.....	1	S.....	.....	.....	.....
Hatfield.....A	.....	Conn.....	.....	Dyneto....	6	Dyneto....	6	Willard....	111	6	1	GI....	.....	.....	...
Haynes.....47	Single	Kingston..	Hand...	Leece-N...	6	Leece-N...	6	Willard....	132	6	1	GI....	GT.....	6	5
H. C. S. Special.....	.....	Delco.....	Hand...	Delco.....	.....	Delco.....	.....	Willard....	111	.....	.....	.....	.....	.....	.....
Hollier.....206-B	Single	West.....	Hand...	West.....	6	West.....	6	U. S. L....	80	6	1	S.....	GT.....	6	20
Holmes.....	Single	Eisemann..	Auto....	Dyneto....	12	.....	.....	Willard....	69	12	2	S.....	GT.....	15	15
Hudson Super-Six....	Single	Delco.....	H & A..	Delco.....	7	Delco.....	7	Exide.....	105	6	1	GM..	.....	.....	.....
Huffman.....	Single	Conn.....	Hand...	Dyneto....	6	Dyneto....	6	Willard....	90	6	1	S.....	.....	6	25
Hupmobile.....R	Single	At-Kent...	Hand...	West.....	6	West.....	6	Willard....	90	6	1	S.....	Encl....	6	10
Jackson.....6-38	Single	Remy.....	Hand...	A-L.....	6	A-L.....	6	U. S. L....	94	6	1	GI....	GT.....	6-8	15
Jones.....All	Single	Remy.....	Hand...	A-L.....	6	A-L.....	6	Prest-O-L..	120	6	1	GI....	GT.....	6	20
Jordan.....F	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	S.....	C. B....	.....	.....
Jordan.....M	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	S.....	C. B....	.....	.....
Kenworthy4-80&6-55	Single	Bosch	Hand ..	West.....	6	West.....	6	Exide	140	6	1	S.....	.....	6	10
King.....8	Single	At-Kent...	Hand...	West.....	6	West.....	6	Prest-O-L..	120	6	1	S.....	Cart....	6	10
Kissel.....All	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	111	6	1	S.....	3 A. G..	6	20
Kline.....6-55-J	Single	Conn.....	Hand...	Wagner...	6	Wagner...	6	Prest-O-L..	80	6	1	S.....	5 A. G..	6	.....
LaFayette.....	Single	Delco.....	H & A..	Delco.....	6	Delco.....	6	Exide.....	130	6	1	GM..	C. B....	.....	.....
Leach.....	Double	Delco.....	Hand...	Delco.....	6	Delco.....	6	Prest-O-L..	180	6	1	S.....	Cart....	6	15
Lexington.....S-20	Single	Conn.....	Hand...	G. & D....	6	G. & D....	6	Willard....	111	6	1	.....	GT.....	6	15-5
Liberty.....10-C	Single	Wagner...	Hand...	Wagner...	6	Wagner...	6	Willard....	90	6	1	GI....	.....	.....	.....
Locomobile....48-6-7	Dual	Berling	Hand...	West.....	6	West.....	6	Exide.....	150	6	1	S.....	G. T....	6	10
Lorraine.....	Single	West.....	Hand...	West.....	6	West.....	6	U. S. L....	94	6	1	S.....	GT.....	.....	.....

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: *At-K*, Atwater-Kent; *Conn.*, Connecticut; *West*, Westinghouse; *Auto*, Automatic; *H & A*, Hand and Automatic; *S. A.*, Semi-Automatic. Generator: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *Ward-L.*, Ward-Leonard; *N. E.*, North East; *Split*, Splitdorf. Motor: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *West*, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE									SPARK PLUGS			Horn	Make and Model
Base Contact	Headlights		Sidelights		Taillights		Dashlight		Make	Diam. Inches	Thread Pitch		
	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.					
Single	6-8	18	*6-8	5	6-8	2	6-8	2	Champion	7/8	18	Klaxon	Allen 43
Single	6-8	15	*6-8	5	3-4	2	d3-4	2	Bethlehem	7/8	18	Sparton	American C
Single	6-8	17			6-8	2	6-8	2	A. C.	7/8	18	E. A. L.	Anderson All
Double	6-8	18	*6-8	4	d6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Apperson All
Single	6-8	15	*6-8	4	6-8	2	6-8	2	Rajah	7/8	18	E. A.	Auburn 6-39
Single	6-8	21	6-8	4	3-4	2	3-4	2	Champion	7/8	18	Trojan	Beggs 20-T
Single	6-8	15	6-8	5	6-8	2	6-8	2	A. C.	7/8	18	Trojan	Bour-Davis 21
Single	12	36	12	4	6-8	2	d6-8	2	Herz-Boug	7/8	18	Klaxon	Brewster
Single	6-8	21			6-8	2	d6-8	2	Champion	7/8	18	Sparton	Briscoe 4-34
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Stewart	Buick
Single	7	18	8	6	4	2	3-4	2	Titan	7/8	18	Delco	Cadillac 59
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8		Klaxon	Case V-20
Single	6-8	15	6-8	4	6-8	2	6-8	2		7/8	18		Chalmers 35-C
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Garford	Champion KO
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Chandler All
Single	6-8	21	6-8	4	6-8	2	d6-8	4	A. C.	7/8	18	Klaxon	Chevrolet All
Single	6-8	17	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Trojan	Cleveland 40
Single	6-8	21	*6-8	5	6-8	4	d6-8	5	A. C.	7/8	18	Sparton	Cole All
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	Champion	7/8	18	Schwarze	Columbia All
Single	6-8	18			6-8	2	6-8	4	A. C.	7/8	18	Klaxon	Comet C-53
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	E. A. L.	Commonwealth 42
Single	6-8	15	6-8	4	6-8	2	d6-8	2	Champion	7/8	18	E. A. Lab.	Crow-Elkhart L-55
Single	6-8	21	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Sparton	Cunningham V-4
Single	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Daniels 8-D
Single	6-8	21			6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Davis 51
Double	6-8	15			d3-4	2	d3-4	2	Champion	7/8	18	Garford	Dixie Flyer
Single	12-16	15			12-16	2	12-16	2	A. C.	7/8	18	NorthEast	Dodge Brothers
Single	6-8	21	6-8	4	6-8	2	6-8	2	Opt.	7/8	18	Klaxon	Dorris
Single	6-8	15			6-8	2	d6-8	2	A. C.	7/8	18	Schwarze	Dort 15
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	du Pont A
Single													Economy 6-46
Single	6-8	21	6-8	4	6-8	2	6-8	2	Champion	7/8	18	E. A. L.	Elcar All
Single	6-8	21			6-8	2	6-8	2	Champion	7/8	18	E. A. L.	Elgin K
Single	6-8	15			3-4	2	*3-4	2	A. C.	18 m.m.	1.5 m.m.	Sparton	Essex A
Single	6-8	21	6-8	6	6-8	2	6-8	4	Champion	7/8	18	Klaxon	Ferris
Sgl.&Dbl.	6-8	17	6-8	2	6-8	2			Champion	1/2	pipe	Own	Ford T
Double	12-16	15	*12-16	4	6-8	2	6-8	2	Opt.	7/8	18	Klaxon	Franklin 9-B
Single	6-8	15			6-8	2	6-8	2	Champion	7/8	18	Trojan	Gardner G
Single	6-8	21			6-8	2	6-8	2	Champion	7/8	18	Trojan	Geronimo
Single	6-8	15	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Trojan	Grant H
Single	6-8	15			6-8	3	6-8	3	Champion	7/8	18	Schwarze	Hanson 54-A
Single	6-8	15			3-4	2	d3-4	2	A. C.			Schwarze	Harroun
	6-8		3-4		3-4		*3-4			7/8	18		Harvard 4-20
Single	6-8	15	*4-8	4	6-8	4	6-8	2	A. C.	7/8	18	Ecco	Hatfield A
Single	6-8	15	*6-8	12	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Haynes 47
													H. C. S. Special
Single	6-8	15	6	4	3-4	2	3-4	2	A. C.	7/8	18	Sparton	Hollier 206-B
Double	12-16	21			6-8	2	6-8	2	Bethlehem	7/8	18	Klaxon	Holmes
Single	6-8	15	6-8	4	3-4	2	*3-4	2	A. C.	7/8	18	Sparton	Hudson Super Six
													Huffman
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Trojan	Hupmobile R
Single	6-8	15	6-8	4	3-4	2	3-4	2	A. C.	7/8	18	Stewart	Jackson 6-38
Double	6-8	15	*6-8	4	s6-8	2	s6-8	2	Champion	7/8	18	Newtone	Jones
Single	6-8	18	*6-8	4	6-8	3	6-8	3	A. C.	7/8	18	Sparton	Jordan F
Single	6-8	18	6-8	4	6-8	3	6-8	3	A. C. & Rajah	7/8	18	Sparton	Jordan M
Single	6-8	21	6		6-8	2	6-8	2	A. C.	7/8	18	Sparton	Kenworthy 4-80&6-55
Single	6-8	15	*6-8	4	6-8	2	6-8	2	Champion	7/8	18	Sparton	King 8
Double	6-8	18			d6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Kissel
Single	6-8	15			6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Kline 6-55-J
Single	6-8	21	6-8	4	3-4	2	3-4	2	A. C.	7/8	18	Klaxon	LaFayette
Single	6-8	32	6-8	5	6-8	2	6-8	2	Champion	7/8	18	Klaxon	Leach
Single	6-8	21	6-8	4	6-8	2	d6-8	4	Bethlehem	7/8	18	E. A. L.	Lexington S-20
Single	6-8	15	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	United	Liberty 10-C
Single	6-8	21	6-8	4	6-8	2	6-8	2	Titan	7/8	18	Klaxon	Locomobile 48-6-7
Single	6-8	17			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Lorraine

Battery: *Prest-O-L*, Prest-O-Lite. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

Specifications of the Electrical Equipment Found on 1920 Passenger Cars

Make and Model	IGNITION			GENERATOR		MOTOR	BATTERY				Wiring System	Units Combined	FUSES		
	System	Make	Control	Make	Voltage	Make	Voltage	Make	Amp. Hr.	Voltage			Type	Volts	Amp.
Maibohm.....B	Single	At-Kent...	Hand...	Bijur.....	6	Bijur.....	6	Willard....	90	6	1	S.....	2-A.....	6	20
Marmon.....34	Single	Delco.....	Auto....	Delco.....	6	Delco.....	6	Willard....	153	6	1	GI.....	.....	.....	.....
Maxwell.....25	Single	At-Kent...	Hand...	.....	6	.....	6	Prest-O-L..	87½	6	1	S.....	3A.....	6	20
McFarlan..... 127	Double	Opt.....	Hand...	West.....	6	West.....	6	Willard....	132	6	1	GI....	5 A. G..	6	.....
Mercer.....Ser. 5	Single	Eisemann.	Hand...	West.....	6	West.....	6	Willard....	153	6	1	S.....	Cart.....	.....	10
Meteor.....KR	Single	Simms....	Hand...	Bijur.....	6	Bijur.....	6	Willard....	111	6	.....	.....	.....	.....	.....
Metz, Master Six.....	Single	Conn.....	Hand...	West.....	6	West.....	6	Willard..	111	6	1	.....	.....	.....	.....
Mitchell.....F-40	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	90	6	1	GI...	GT.....	6	10
Monitor.....	Single	Conn.....	Hand...	Dyneto....	6	Dyneto....	.....	Prest-O-L..	110	6	1	.....	.....	.....	.....
Monroe.....S-9	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	U. S. L....	80	6	1	.....	.....	.....	.....
Moon.....6-48	Single	Delco.....	Auto....	Delco.....	6	Delco.....	6	Exide.....	120	6	1	S.....	.....	.....	.....
Moon.....6-68	Single	Delco.....	Auto....	Delco.....	6	Delco.....	6	Exide.....	120	6	1	S.....	.....	.....	.....
Moore.....F	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	Willard....	90	6	2	.....	.....	.....	.....
Nash.....	Single	Wagner...	H & A..	Delco.....	6	Wagner...	6	Willard....	111	6	1	S.....	.....	.....	.....
National....Series BB	Single	Delco.....	H & A..	West.....	6	West.....	6	Prest-O-L..	110	6	1	S.....	GT.....	6-8	5
Nelson.....D	Single	Bosch.....	Hand...	U. S. L....	12	U. S. L....	12	Willard....	69	12	2	S.....	G.....	12	5-30
Noma.....1-B	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	.....	.....	.....	.....	.....
Oakland.....34-B	Single	Remy.....	Hand...	Remy.....	6-8	Remy.....	6	Prest-O-L..	100	6-8	1	GI.....	.....	.....	.....
Ogren.....6-60	Single	Bosch.....	Hand...	West.....	6	West.....	6	Willard....	111	6	1	.....	Cart....	6	10
Oldsmobile.....37-A	Single	Remy.....	Hand...	Remy.....	6	Willard...	6	Remy.....	80	6	1	.....	.....	.....	.....
Oldsmobile.....45-B	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	.....	.....	.....	.....
Olympian.....45	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	U. S. L.....	.....	6	.....	.....	.....	.....	.....
Overland.....4	Single	Conn.....	Hand...	A-L.....	6-8	A-L.....	6	U. S. L....	80	6-8	1	GI....	Glass....	6	20
Packard.....	Single	Delco.....	H & A..	Bijur.....	6	Bijur.....	6	Willard....	134	6	1	S.....	GT.....	6	10
Paige.....All	Single	At-Kent...	H & A..	G & D....	6	G & D....	6	Willard....	111	6	1	S.....	G.....	.....	20
Pan-American.....All	Single	At-Kent...	Hand...	West.....	6	West.....	6	Willard....	111	6	1	S.....	G.....	6	.....
Paterson.....6-47	Dual	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	.....	.....	.....	.....
Peerless.....Ser. 6	Single	At-Kent...	H & A..	A-L.....	6	A-L.....	6	Willard....	132	6	1	.....	.....	.....	30
Piedmont.....4-30	Single	Delco.....	Hand...	Dyneto....	6	Dyneto....	6	Willard....	90	6	1	S.....	.....	.....	.....
Piedmont.....6-40	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	90	6	1	S.....	.....	.....	.....
Pierce-Arrow..38&48	Double	Delco.....	H & A..	West.....	6-8	West.....	6	Willard....	153	6	1	S.....	GT.....	6-8	10
Pilot.....6-45	Dual	Delco.....	Hand...	Delco.....	6	Delco.....	6	Prest-O-L..	80	6	1	GI.....	.....	.....	.....
Porter.....46	Dual	Berling....	Hand...	West.....	12	West.....	12	Prest-O-L..	118	12	1	S.....	Cart....	12	15
Premier.....6-D	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	111	6	1	S.....	.....	.....	.....
Reo.....T & U	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Willard....	111	6	2	GI....	Wire....	6	5
Reo.....T 6& U6	Single	North East	Hand...	North East	6	North East	6	Willard....	111	6	1	S.....	Wire....	6	6
Revere.....	Single	Bosch.....	Hand...	West.....	6	West.....	6	Willard....	153	6	1	S.....	GT.....	6	15
Roamer.....4-75	Single	Bosch.....	Hand...	West.....	6	West.....	6	Columbia..	117	6	1	S.....	3A.....	6	15
Roamer.....4-75	Single	Bosch.....	Hand...	West.....	6	West.....	6	Columbia..	117	6	1	S.....	3A.....	6	15
R & V Knight..J & R	Dual	Wagner...	Hand...	Wagner...	6	Wagner...	6	Willard....	111	6	1	S.....	Cart....	250	20
Saxon.....125	Single	Remy.....	Hand...	Wagner...	6	Wagner...	6	Prest-O-L..	80	6	1	S.....	Cart....	6-8	15
Sayers.....C.P.	Single	Delco.....	Hand...	Delco.....	6	Delco.....	6	Willard....	90	6	1	GI....	C.B.....	.....	.....
Scripps-Booth.....B	Single	Remy.....	Hand...	Remy.....	6	Remy.....	6	Prest-O-L..	85	6	1	GI....	GT.....	6	20
Seneca L	Single	Conn.....	Hand...	Allis Chal..	6	Allis Chalm	6	Prest-O-L..	88	6	1	GM....	.....	.....	20
Severin.....H	Single	Wagner...	Hand...	Wagner...	6	Wagner...	6	Campbell..	110	6	1	None.	Cart...	6	10
Singer.....20	.....	Philbrin...	Hand...	West.....	6-8	West.....	6	Willard....	153	6	1	S.....	G. C....	6	15-20
Skelton.....35	Single	Conn.....	Hand...	West.....	6	West.....	6	Prest-O-L..	85	6	1	S.....	.....	6	10
Spacke.....S-20	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Standard.....8-I	Double	Dixie.....	Hand...	West.....	6	West.....	6	Willard....	153	6	1	S.W...	2-A.....	6	15
Stanley.....735	.....	.....	.....	Remy.....	6	.....	.....	Willard....	90	6	1	G.....	Cart....	6	20
Stanwood .....A	Single	At-Kent...	Hand...	West.....	6	West.....	6	Willard....	153	6	1	S.....	Cart....	6	10
Stearns.....SKL-4	Single	At-Kent...	Hand...	West.....	12	West.....	12	Willard....	69	12	1	S.....	Cart....	12	20
Stephens.....80	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	U. S. L....	116	6	1	S.....	Cart....	6	20
Stevens-Duryea....E	Double	Berling....	Hand...	West.....	6-8	West.....	6-8	.....	.....	6-8	1	S.....	Cart....	6	15
Studebaker.....All	Single	Wagner...	Hand...	Wagner...	6	Wagner...	6	Willard....	111	6-8	1	S.....	Cart....	6	10
Stutz.....H	Double	.....	Hand...	Remy.....	6	Remy.....	6	Willard....	132	12	1	.....	.....	.....	.....
Templar.....445	Single	Simms....	Hand...	Bijur.....	6	Bijur.....	6	Prest-O-L..	100	6	1	S.....	Cart....	6	20
Texan....B-38&A-38	Single	Conn.....	Hand...	Bijur.....	6	Bijur.....	6	Prest-O-L..	80	6	1	S.....	Cart....	6	20
Tulsa.....E-1,2,3	Single	Conn.....	Hand...	Dyneto....	6	Dyneto....	6	Exide.....	90	6	1	S.....	GT.....	6	15
Velie.....48	Single	At-Kent...	S. A....	Bijur.....	6	Bijur.....	6	Willard....	111	6	1	S.....	Wire....	.....	15
Vogue....6-55 & 6-66	Single	Conn.....	Hand...	A-L.....	6	A-L.....	6	Willard....	111	6	1	.....	Cart....	1-250	15
Wasp.....	Single	Bosch.....	Hand...	West.....	6	West.....	6	Exide.....	135	6	1	S.....	Cart....	6	20
Westcott...C-38&C-48	Single	Delco.....	H & A..	Delco.....	6	Delco.....	6	Willard....	111	6	1	S.....	CB.....	.....	.....
Willys-Knight.....20	Single	Conn.....	Hand...	A-L.....	6-8	A-L.....	6	U. S. L....	170	6	1	GI....	GT.....	6	20
Winton Six.....24	Single	Bosch.....	Hand...	Bijur.....	6	Bijur.....	6	Willard....	132	6	.....	S.....	GT.....	6	15
Winton Six.....25	Single	Bosch.....	Hand...	Bijur.....	6	Bijur.....	6	Willard....	132	6	1	S.....	CB.....	.....	.....
Winther.....61	Single	West.....	Hand...	West.....	6	West.....	6	Willard....	111	6	.....	S.....	GI.....	6	10

ABBREVIATIONS: *Starting and Lighting in closed models only. Ignition: *At-K*, Atwater-Kent; *Conn.*, Connecticut; *West*, Westinghouse; *Auto*, Automatic; *H & A*, Hand and Automatic; *S. A.*, Semi-Automatic. Generator: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *Ward-L.*, Ward-Leonard; *N. E.*, North East; *Split*, Splitdorf. Motor: *A-L*, Auto-Lite; *G & D*, Gray & Davis; *Leece-N*, Leece-Neville; *West*, Westinghouse.

Giving Ignition, Starting, Lighting, Battery, Lamp, Spark Plug and Horn Data

LAMP CANDLEPOWER, VOLTAGE AND TYPE OF BASE									SPARK PLUGS			Horn	Make and Model
	HEADLIGHTS		SIDELIGHTS		TAILLIGHTS		DASHLIGHT						
Base Contact	Volts	CP.	Volts	CP.	Volts	CP.	Volts	CP.	Make	Diam. Inches	Thread Pitch		
Single	6-8	20	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Maibohm B
Single	6-8	27	*6-8	8	6-8	2	6-8	2	A. C.	7/8	18	Sparton	Marmon 34
Single	6-8	15			6-8	2	6-8	2	Champion	7/8	18	Schwarze	Maxwell 25
Single	6-8	21	*6-8	12	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	McFarlan 127
Single	6-8	20	6-8	5	6-8	2	6-8	4	Champion	7/8	18	Sparton	Mercer Ser. 5
Single	6-8		6-8		6-8		6-8		A. C.				Meteor K R
Single	6-8	16	6-8	4	6-8	2	6-8	2	Champion	7/8	18	Trojan	Metz, Master Six
Single	6-8	21	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Sparton	Mitchell F-40
									Champion	7/8	18	Klaxon	Monitor
Double	6-8	16			6-8	2	6-8	2	Champion	7/8	18	Trojan	Monroe S-9
Single	6-8	20			6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Moon 6-48
	6-8	20			6-8	2	d6-8	2	Champion	7/8	18	Klaxon	Moon 6-68
Single	6	20	6-8		6-8	2			Champion	7/8	18	Garford	Moore F
Single	6-8	15	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Nash
	6-8	20	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Sparton	National Series BB
Double	12-16	15	12-16	4	12-16	2	12-16	2	Champion	18 m.m.		Schwarze	Nelson D
Single	6-8				6-8		d6-8						Noma 1-B
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Oakland 34-B
Single	6	32	6		6	4	6	4	Champion	7/8	18	Klaxon	Ogren 6-60
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Oldsmobile 37-A
Single	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Oldsmobile 45-B
									Champion			E. A. Lab.	Olympian 45
Single	6-8	16			3-4	2	*3-4	2	Champion	1/2		A. L.	Overland 4
Single	6-8	21	*6-8	4	6-8	2	6-8	4	A. C.	7/8	18	Sparton	Packard
Single	6-8	17	6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Trojan	Paige All
Single	6-8	32			6-8	2	*3-4	4	A. C.	7/8	18	E. A. Lab.	Pan-American All
Single	6-8	15	6-8	4	6-8	2	6-8	2	A. C.			E. A. Lab.	Paterson 6-47
Single	6-8	15	6-8		6-8	2	6-8	4	A. C.			Sparton	Peerless Ser. 6
Single	6-8	12			6	2	6	2	Champion	7/8	18	Klaxon	Piedmont 4-30
Single	6-8	12			6	2	6	2	Champion	7/8	18	Klaxon	Piedmont 6-40
Single	6-8	20			6-8	5	6-8	5	A. C.	7/8	18	Klaxon	Pierce-Arrow 38&48
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Schwarze	Pilot 6-45
Single	12-16	20	12-16	4	12-16	4	12-16	2	A. C.		18	Stewart	Porter 46
Double	6-8	21	*6-8	4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Premier 6
Double	7	15			3-4	2	*3-4	2	A. C.	1/2	18	Trojan	Reo T & U
Single	7	15			6	2	6	2	A. C.	1/2	18	North East	Reo T6 & U6
Single	6-8	20	*6-8	8	6-8	4	6-8	4	Optional	7/8	18	Klaxon	Revere
													Roamer 4-75
Single	6-8	15	6-8	8	6-8	2	4	2	A. C.	7/8	18	Sparton	Roamer 4-75
Single	6-8	15	6-8	4	6 8	2	d6-8	4	A. C.	7/8	18	Klaxon	R & V Knight. J. & R.
Single	6-8	15			6-8	2	6-8	2	A. C.	7/8	18	Trojan	Saxon 125
Single	6-8	15			6-8	2	d6-8	2	Champion	7/8	18	Stewart	Sayers C. P.
Single	6-8	18			6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Scripps-Booth B
Single	6-8	15	6-8	2	6-8	2	d6-8	2	A. C.	7/8	18	Fitzgerald	Seneca L
Double	6	17	6	5	6	2	6	2	Champion	7/8	18	Klaxon	Severin H
	6-8	15		4	6-8	2	d6-8	2	A. C.	7/8	18	Klaxon	Singer 20
Single	6	18			6	2	6	2	Bethlehem	7/8	18	E. A. Lab.	Skelton 35
													Spacke S-20
Double	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Standard 8-I
Double	6-8	21	6-8	4	6-8	2	6-8	2				Klaxon	Stanley 735
Single	6	17	6	10	6	7	6-8	2	A. C.	7/8	18	Klaxon	Stanwood A
Single	12-16	21	*12-16	4	12-16	2	12-16	2	A. C.	7/8	18	B.&A.Lab.	Stearns SKL-4
Single	6-8	15	6-8	2	6-8	2	6-8	2	Champion	7/8	18	Trojan	Stephens 80
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Stevens-Duryea E
Single	6-8	12			6-8	2	6-8	2	Champion	1/2		Sparton	Studebaker All
Double	6-8	15	*6-8	4	6-8	2	6-8	2	A. C.			Klaxon	Stutz H
Single	6-8	21	*6-8	4	6-8	2	6-8	2	Champion	7/8		Klaxon	Templar 445
Single	6	16			6	5	6	5	A. C.	7/8	18	Klaxon	Texan B38&A38
Single	6-8	21	6-8	2	6-8	2	d6-8	2	Champion	7/8	18	Trojan	Tulsa E-1,2,3
Single	6-8	15	6-8	4	6-8	4	d6-8	4	Champion	7/8	18	Sparton	Velie 48
Single	6-8	21	6-8	4	6-8	2	6-8	2	A. C.	7/8	18	Klaxon	Vogue 6-55 & 6-66
													Wasp
Single	6-8	18	*6-8	4	3-4	2	d3-4	2	A. C.	7/8	18	Klaxon	Westcott C-38&C-48
Single	6-8	30			3-4	2	*3-4	2	Champion			Sparton	Willys-Knight 20
Single	6-8	21	6-8	6	6-8	2	6-8	2	Champion	7/8	18	American	Winton Six 24
Single	6-8	21	6-8	6	6-8	2	6-8	2	Champion	7/8	18	Electric	Winton Six 25
Single	6	18			6	4	6	2	A. C.	7/8	18	Klaxon	Winther 61

Battery: *Prest-O-L*, Prest-O-Lite. Wiring system: *GI*, Generator and Ignition combined; *GIM*, Generator, Ignition, Motor combined; *S*, Generator, Motor Ignition separate; *GM*, Generator and Motor combined. Fuses: *GT*, Glass Tube; *Cart*, Cartridge; *C. B.*, Circuit Breaker. Lamps: *Dashlights in series with taillights; headlight contains sidelight; d,—double contact; s,—single contact.

From the Four Winds

Glimpses at the World of Motordom

Coming Motor Events

AUTOMOBILE SHOWS

Des Moines, Ia.	Annual Fall Show	Aug. 25-Sept. 6
Toronto, Exhibition City	National Automobile Show	Aug. 28-Sept. 11
Milwaukee	Annual Fall Automobile Show	Aug. 30-Sept. 4
Sacramento, Cal.	Annual Show	Sept. 4-12
Indianapolis	Fall Automobile Show	Sept. 6-11
Cincinnati	Annual Passenger Car Show	Sept. 18-25
Buffalo	Closed Car Show	Sept. 27-Oct. 2
Northampton, Mass.	Annual Automobile Show	Oct. 6-8
Jersey City, N. J.	Annual Automobile Show	Nov. 1-6
New York	Automobile Salon	Nov. 14-21
Chicago	Automotive Equipment Show	Nov. 15-20
New York	National Passenger Car Show	Jan. 8-15, 1921
Chicago	National Passenger Car Show	Jan. 29-Feb. 4, 1921

TRACTOR SHOWS

Los Angeles, Cal.	National Tractor and Implement Show of the West	Sept. 20-26
Columbus, O.	National Tractor Show	Feb. 6-12, 1921

FOREIGN SHOWS

London	Commercial Vehicles, Exhibition, Olympia	October
London	Passenger Car Show, Olympia	November

RACES

Paris, France	Grand Prix Race, Sporting Commission	August
Buffalo, N. Y.	Dirt Track	Aug. 14
Elgin, Ill.	Road Race	Aug. 21
Johnstown City, Pa.	Dirt Track	Aug. 21
Middletown, N. Y.	Dirt Track	Aug. 20-21
Flemington, N. J.	Dirt Track	Aug. 27-28
Canandaigua, N. Y.	Dirt Track	Aug. 28
Hornell, N. Y.	Dirt Track	Sept. 6
Uniontown, Pa.	Speedway Race	Sept. 6
Syracuse, N. Y.	Dirt Track	Sept. 17-18
Allentown, Pa.	Dirt Track	Sept. 25
Los Angeles, Cal.	Speedway Race	Nov. 25

TOURS

Milwaukee, Wis.	Annual Fall Automobile Show	Aug. 30-Sept. 4
Detroit	Good Roads Assn. Tour	July 14-20

CONVENTIONS

Cincinnati	Ohio Automobile Trade Assn. Fourth Annual Convention	Dec. 8-10
Atlantic City	National Implement and Vehicle Ass'n, Twenty-seventh Annual Convention	Oct. 20, 21, 22

Roy S. Davey, formerly general sales manager of the Bethlehem Motors Corp., has joined the Graham Bros. Sales Co., New York, distributor of the Bethlehem Truck, as general sales manager.

L. E. Wagner has resigned as corporation sales manager for the Diamond "T" Motor Truck Co., to become sales manager of the Chicago Oneida Truck Co. W. J. Burns, formerly in charge of the trucks of the American Railway Express Co. in the Chicago district, has become associated with the Haulage Analysis Bureau of the truck company at Green Bay, Wisconsin.

Chrles P. Hennessy has been appointed sales manager and Carl H. Page, director of sales and advertising of the Saxon Motor Car Corp.

William D. Horne, Jr., formerly associated with the Locomobile Co., Bridgeport, Conn., has joined the Eaton Axle force according to an announcement by George L. Bitting, director of sales.

R. Jackson Jones has been appointed European representative of the Traffic Motor Truck Corporation and has established an office in London. For the last year he has been assistant to Harry H. Hawke, general sales manager of the corpoartion. J. Albert McCollum has succeeded Mr. Jones, and Millard S. Binney, formerly with the Chalmers Motor Car Co., has been made advertising manager to succeed Mr. McCollum.

Champion Ignition Co., maker of the A. C. spark plug, will begin construction immediately on a plant at Brantford, Ont.

The Kennedy Car Liner & Bag Co., Shelbyville, Ind., of which Fred W. Kennedy is president, is now operating a Canadian factory at Woodstock, Ontario.

Theodore A. Earle, for ten years identified with the automobile industry in Boston as salesman and in executive positions and manager for Frank E. Wing at the Springfield Marmon branch since last spring, died at his home July 21 after a brief illness suffering from throat trouble. He was 35 years old and during the war served with the Massachusetts motor corps.

The ninth annual outing of the Chicago Garage Owners' Association will be held at Wheeling, Ill., on August 26. There will be special contests and dancing. It is expected that the attendance will reach 500.

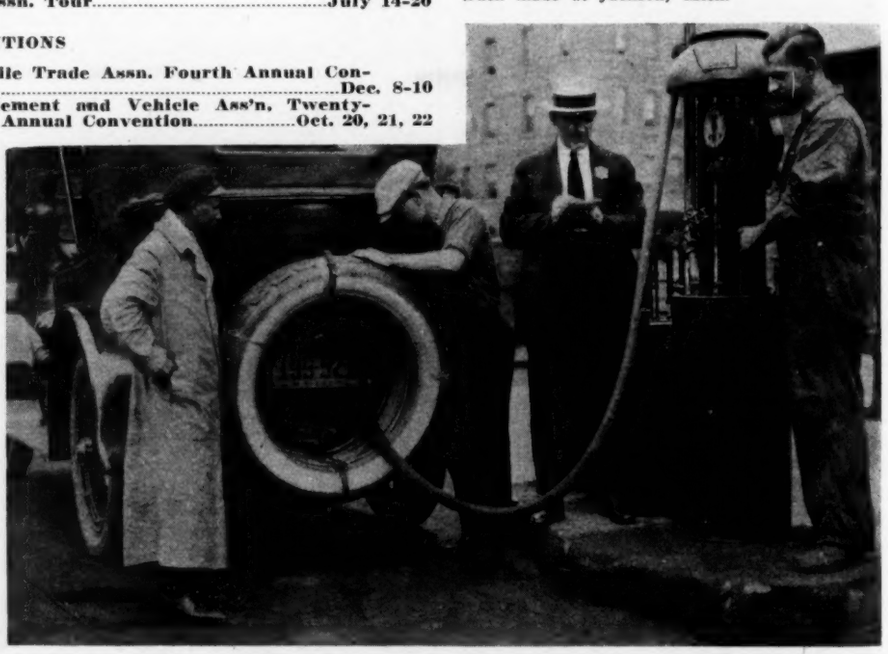
Frank C. Kip, formerly sales promotion manager of the Packard Motor Car Co., has disposed of his interest in the Automotive Products Corp. of California and has resigned as its president. Mr. Kip will become general manager of the Geo. D. Bailey Co., Chicago, service division for the Shafer rollng bearings, where he will have entire charge of sales and advertising.

Harry J. Henderson, manager of the Madison Buick Co., Madison, Wis., died July 31 at his home in that city at the age of 32 years, following a brief illness. Prior to entering business in Madison, Mr. Henderson was manager of the Savage Automobile Co., at LaCrosse, Wis.

Manufacture of passenger cars and truck by the Preston Motors Corp., Birmingham, Ala., will start immediately at the main plant of the company which was formerlly opened on Aug. 2. The corporation has been manufacturing cars for several months in its No. 2 plant at North Birmingham.

The Columbia agency in Chicago has been taken over by the Dorris Chicago Co., Louis J. Sherland, manager.

The Dorn Motor Sales Co., Toledo, has been organized to handle the Jackson four-wheel drive truck made at Jackson, Mich.



Examining one of the recently installed gasoline pumps at a service station. A great loss of life and property is the result of carelessness in inspecting these places, and as there are about 1,500 such stations, it is easy to see why the Department of Combustibles is so careful. (Copyright, Keystone Company.)